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JUNE/JULY 2006

game developer

THE LEADING GAME INDUSTRY MAGAZINE

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STREAMING DATA FOR
CONTINUOUS PLAY

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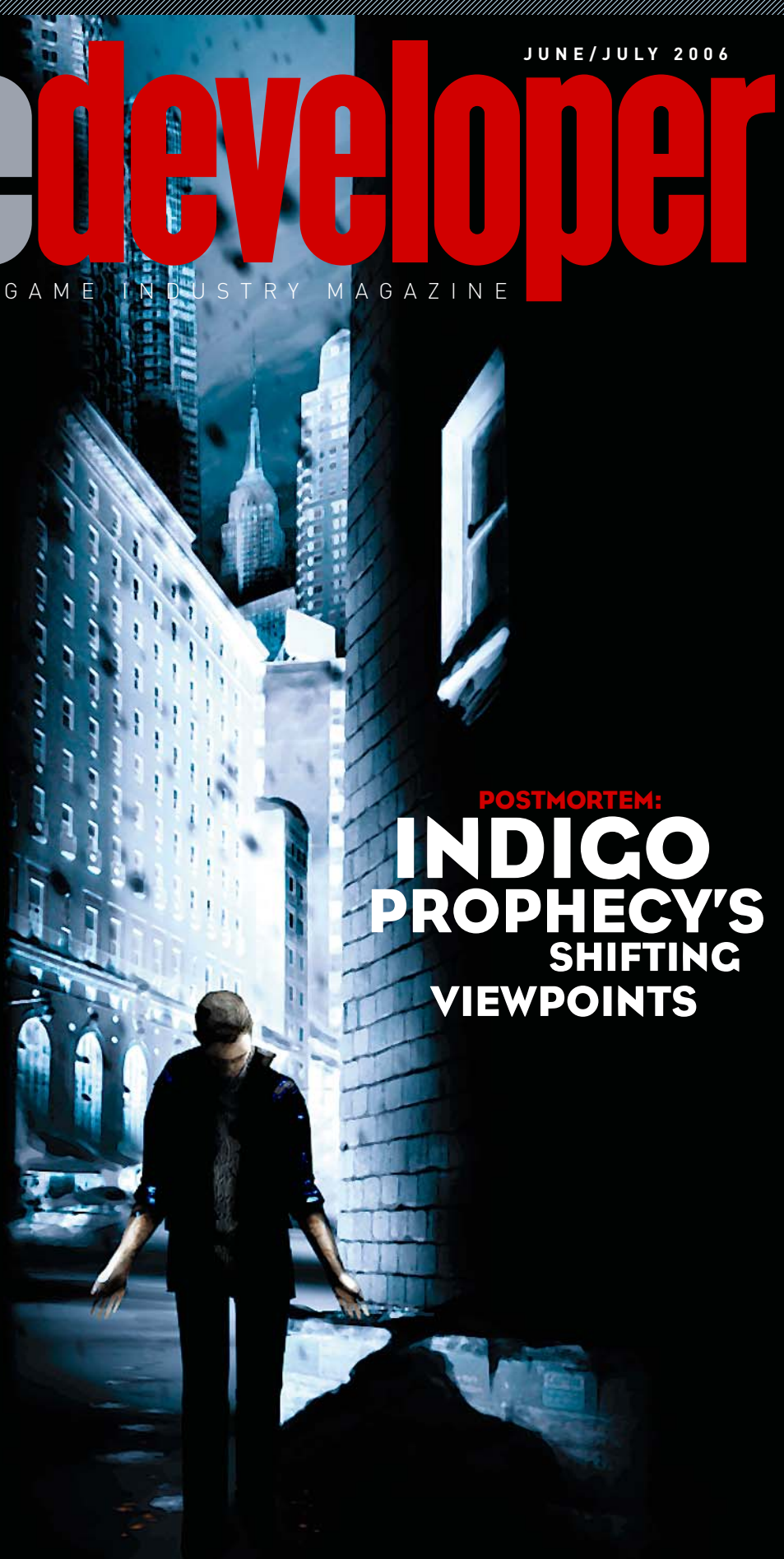
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POSTMORTEM

24 INDIGO PROPHECY: THE NIGHTMARE OF THE ORIGINAL CONCEPT

On paper, pushing for increased emotion, original play concepts, and new methods of storytelling all in the same game sounds like the ravings of a madman. INDIGO PROPHECY may not have hit all of these points perfectly, but it has blazed a trail of innovation, and raised the bar for the integration of story and gameplay. In this postmortem, David Cage tackles everything from narrative to digital puppetry, and tells us why changing publishers can save your game.

By David Cage

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By Paul Hyman

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EXCITEMENT x3

THE MOST INTERESTING THING ABOUT E3 2006

was that both Sony's Phil Harrison and Microsoft's Peter Moore publicly suggested that either they themselves or consumers should think about buying Nintendo's Wii this holiday season (in addition to their company's own console, of course). The leftfield presentation of Nintendo's newest machine, the company's refusal to even announce a price at E3, and its deliberate downplaying of HD capabilities allow both Microsoft and Sony to not feel threatened by Satoru Iwata's mercurial contraption.

But should they be?

WII WANT WONDERMENT

Oddly, many industry folks I talked to in Los Angeles were impressed by the general idea of the Wii, but not exactly speechless about all its current implementations. The tennis game in *Wii Sports*, as demonstrated by Miyamoto, Iwata, and friends at the Nintendo pre-show press conference, was generally cited as the most naturalistic and free-flowing execution. Other games, such as *Wario Ware for Wii*, also exemplify the mainstream party-style interactions that are possible with the controller, which really does have the opportunity to open up gaming way beyond the norm.

However, some of the abstract movements that players need to perform in order to play games like *ZELDA: TWILIGHT PRINCESS* are so tortuous, they're almost confusing. A number of third-party titles also illustrated how easy it is to make imprecise control schemes for the machine.

Yet, remember the DS in its early stages. When one considers the lack of completely fleshed-out software that used the touchscreen when Nintendo's latest handheld launched, and the strides that have been made since, the Wii suddenly seems like an incredibly potent tool again—albeit one that makes the creation of cross-platform titles spectacularly difficult.

MICROSOFT'S STURDY START

The biggest message from this year's E3 was that Microsoft is looking extremely robust, despite its notable hardware supply problems. A well-staged press conference showcasing Bill Gates, *GRAND THEFT AUTO IV*, and *HALO 3* set the stage for an impressive show floor, and from the shouts and murmurs I heard, the general observation was how sturdy Microsoft's overall strategy looks for at least three reasons.

First, Xbox Live Arcade is a notable success, and it is unclear whether Sony will try to compete with it. Second, Microsoft is holding strong with benchmark titles such as *GEARS OF WAR* coming out exclusively for the Xbox 360. Third, all signs point to ease of development (and PC conversion) for 360 game makers.

The only remaining issue is the console's performance in Japan, where, quite frankly, it has already failed. Attempts to prop up the console with exclusives from Tecmo, for example, did little to sustain the market. Without Japanese support, Microsoft's strategy is always going to be at least somewhat lopsided, which is unfortunate from a multitude of angles. Most of all, it means that Japanese exclusives will be few and far between, and many of the most delightful crossover hits of the next generation (think *KATAMARI DAMACY*) are likely to appear on the PlayStation 3.

SONY'S MIXED BLESSING

Plenty of suspect buzz at E3, of course, circled the PlayStation 3's \$499/\$599 price tag. There was an audible hush in the Sony pre-E3 press conference when the amount was announced, partly because the Japanese price had been released first, and the concept of an "open" price for the 60Gb model, although vaguely sensible in Japan, made it sound like the console would be too expensive to even put a concrete figure on it! An interminably long *GRAN TURISMO HD* demo didn't warm up anyone either.

The conclusion is Sony will probably be OK in the end—"OK" meaning it will have the biggest market share in the next console generation, and "in the end" being after the company has brought the excessive price down through economies of scale ... and when it has sorted out its issues with slow hardware development, which have caused many third parties to not receive their development kits until very recently ... and after Sony has managed to actually fit all the complex components into the PlayStation 3 box ... and when the company can get more games to look like *HEAVENLY SWORD* running on the final hardware.

S!

—Simon Carless, editor-in-chief





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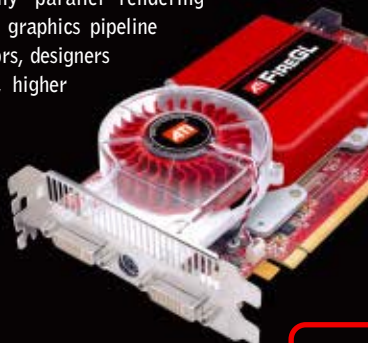
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PHOTO BY AARON NOVAK

E3 COVERAGE

WEEK IN REVIEW

E3 IS A FRIGHTENING, YET EXCITING time for all of us in the industry. For developers, it means build crunches and interviews. For journalists, E3 means working until the bleary-eyed morning hours, playing games they'll just have to review all over again upon release. And for executives, E3 means relaxing with some caviar and a glass of port. Wait, I mean meetings! Lots of meetings! E3 boasted some 60,000 attendees in 2006, down 10,000 from last year. This was the result of a conscious decision by the ESA, the event's organizer, to limit the number of unqualified people at the show and open up floor space.

Outside of the pre-conference keynotes (see Game Plan, page 2), there was much ado about Wii on the show floor. In typical Nintendo E3 fashion, a three-hour line kept most people from ever touching it, leaving many developers content to wait for launch to play it.

South Korean mobile game developer Gamevil echoed the sentiments of many, when *Game Developer* asked company president Kyu C. Lee about Nintendo's future strategy. "Pursuing virtual or hyper reality is one way that games

should head," he said. "On the other hand, I still want those innovative games, things that are fun because of the human mind, not because of the hardware. I think Nintendo is very good at doing that."

Reality is a valuable tool, of course, one which Sony and Microsoft will be exploiting to the fullest. In an interview with Q Entertainment's Tetsuya Mizuguchi, we learned the origins of his hyper real action drama *NINETY-NINE NIGHTS*. He was approached by Microsoft to make a game in high definition. According to Mizuguchi, he took the opportunity and created a more "emotional and dramatic" experience, using HD graphics to augment his vision. "In games, there's a new type of expressing we can make," he said. Innovation need not rely on a revolutionary controller.

While Nintendo didn't unveil a console launch date or price for its new console, Sony certainly did. The PlayStation 3 will be released in Japan on November 11 and in the rest of the world on November 17, with a tiered pricing scheme, not unlike Microsoft's critically panned Xbox 360 release.

The higher-priced PlayStation 3 will retail for \$599 in the US, 599

BEST

EDITOR-IN-CHIEF SIMON CARLESS' PICKS

SPORE (Electronic Arts, PC)
Some say that Will Wright's multi-tiered masterwork is just too much—too many games in one, too many genres. True, but that's exactly why it's one of the best games of the show, again.



BROOKTOWN SENIOR YEAR (Konami, PSP)
DEATH JR. creator Backbone tries a U.S. dating sim, complete with O.C. atmosphere and high school make-out shenanigans, and we love them dearly for it. If the genre can make it in the U.S., it'll be with this game.

DEAD RISING (Capcom, Xbox 360)
So many games are lacking humor, but *MEGA MAN*'s Keiji Inafune gets it, twinning sparkling zombie carnage with hilarious weapons and the American shopping mall experience. Oh, George Romero, we owe you so much.



euros in Europe, and an unspecified amount to be set by retailers in Japan. This model comes with a 60Gb hard drive, Blu-ray disc drive, wi-fi connectivity, HDMI connection, and memory stick reader. The lower-priced model, planned for \$499 in the U.S., 499 euros in the EU, and 59,800 yen in Japan, has a 20Gb hard drive and ships without the wi-fi, HDMI connections, and memory stick reader.

Unlike the Xbox 360 scheme, where the lower model was fully upgradeable, the lower-priced PlayStation 3 will not support HDMI even through upgrade.

On the handheld front, Sony and Nintendo are both powering forward with their very distinct platforms. In terms of portables, the new Nintendo DS hardware revision, the DS Lite, was a focal point for the

company, along with a number of new titles.

Sony may not have announced a new iteration of its PSP, but the company has plenty of new content in the works, from network-downloadable PlayStation games, to new service packs, to Flash support, which has already spawned dedicated portals on sites such as Newgrounds.com.

And not yet out for the count, Nokia formally announced its new strategy of adding its next-gen N-Gage content and Arena platform to its new line of Smartphones.

The next generation is almost fully upon us, and with so many potential directions that the market could move, one can only wonder what the future may hold.

—Brandon Sheffield

O F S H O W

FEATURES EDITOR BRANDON SHEFFIELD'S PICKS



CONTACT (Atlus/Grasshopper Manufacture, Nintendo DS)

CONTACT works that distinctive Grasshopper Manufacture magic, with innovative audio, unconventional design, and unique use of the DS's two screens—it's good to see more niche games like this hitting the U.S. market.

GEARS OF WAR (Epic, Xbox 360)

GEARS OF WAR is pegged as a tipping point for next-gen, and continues to prove itself to be worthy of the hype. As much as we desire a broadened market, I will probably never get tired of "guy shooting things" games.



NOM (Gamevil, Mobile)

Mobile games are a dime a dozen, but every once in a while a game comes along that takes the handheld's limitations into account, adds screwball humor, and actually manages to make mobile fun. Nom is that game!

GAMASUTRA.COM ASSISTANT EDITOR FRANK CIFALDI'S PICKS



ELITE BEAT AGENTS (Nintendo DS, Nintendo/iNiS)

Government agents inspire young girls to be good babysitters and lost dogs to find their way home by rocking out to Deep Purple and Steriogram, while the player taps to the beat.

SUPER MARIO GALAXY (Wii, Nintendo)

As if making a new, honest-to-goodness SUPER MARIO game wasn't enough, GALAXY makes use of the Wii's unique remote in a way that's so intuitive, it feels like it's reading your mind.



HEAVY RAIN (PS3, Quantic Dream)

It's not a playable game just yet, but if the demo reel we saw is indicative of what's to come, Quantic Dream's next-gen project HEAVY RAIN could set the standard for dramatic acting in games.



Wii BE TOOLS PROVIDERS

TOOLS PROVIDERS HAVOK, FREESCALE

Semiconductor, and CRI Middleware have announced support for the Wii, formerly codenamed Revolution, the forthcoming video game console from Nintendo. Supporting the Wii will hold a new set of challenges for tools providers given the console's unique controller—but, unlike its competitors, the Wii does not have high-definition capabilities.

Freescale, which is also the sole provider of GameCube development kits in the U.S., has collaborated with Nintendo to bundle its CodeWarrior Radix Studio with all Wii development kits, which were shipping as of mid-May. The CodeWarrior suite of tools for Nintendo's Wii are powered by

Freescale's Radix technology, a lightweight C++ framework with flexible, modular architecture.

Havok, whose middleware strong card is physics, has also paired with Nintendo in the past by supporting about 15 GameCube titles. Using Havok FX and GPU technology, developers will be able to implement a range of physical effects, such as debris, smoke, or fluids movement, into their games.

Japan-based CRI Middleware, creator of sound and video libraries, officially announced it will offer Wii developers four libraries, CRI ADX, CRI Sofdec, CRI Sound Factory and CRI ROFS, according to Nintendo company literature.

—Jill Duffy

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DEVTRACK 6.0

Dennis Crowley

AS A PROGRAMMER, IT'S AS HARD TO BE excited about bug databases as it is about source control ... or your text editor. Bug-and issue-tracking just isn't sexy.

However, game developers, not to mention software developers, simply must have a solution for handling these problems. If you are a development team of one, you may be able to survive with sticky notes, or better, a text editor. As your team gets a little larger, maybe email and spreadsheets will suffice. Of course, for any serious project, you cannot afford to mess around with a rickety network of ad hoc solutions. Most of us need a bug database.

SERVER SIDE

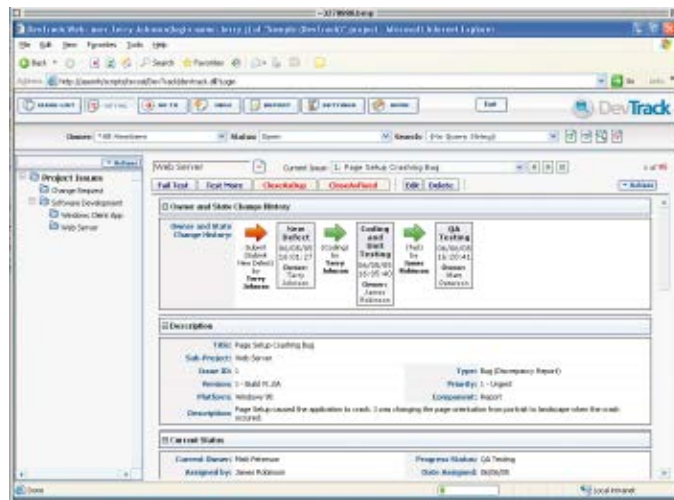
DevTrack is a database-driven, multi-tiered, issue-tracking application. You can translate "issue" here to mean "bug," but the software is not limited to just tracking bugs. The tool from California-based TechExcel virtually eliminates the need for database programming when creating a bug database. The project's setup and administration is GUI-based (making the job slightly more intuitive for non-programmers), while DevTrack handles the database back end (since the tool contains no database itself).

As a multi-tiered application, DevTrack 6 is actually a suite of clients and servers, and as such is scalable. You can set up all of the server programs on one machine, or distribute them across a network for a larger organization, so the solution can grow (or shrink, I suppose) as a team's needs change.

Larger studios that manage many projects will also benefit from the standardization that comes from using only one issue-tracking solution across all its titles.

WINDOWS ONLY

DevTrack is pretty much a Windows-only solution. The servers are Windows-only, as is the native client. The web client can be used on any platform that supports a browser, so if you have some artists using Macs, or developers working on Linux, they don't have to have a Windows



TechExcel's DevTrack 6 is well suited for project managers due to its graphical interface.

machine running to use DevTrack. However, if your organization has decided for whatever reason, be it performance, financial, or ideological, to use something other than Microsoft Windows for your servers, DevTrack will not work for you.

On the other hand, your database does not have to be running on Windows, although TechExcel recommends that you use Microsoft SQL Server for ease of database configuration, tuning, and administration. Support does exist for MySQL and Oracle, but administrators must run some setup scripts outside DevTrack in order to use them. These scripts are run once during project setup. Microsoft Access is also supported, but TechExcel does not recommend that developers use it for any substantial project.

WHOSE PROJECT?

While DevTrack 6 doesn't require programming brains to set up projects, it still takes a lot of know-how to do it properly. The administrator must manage access and issue-forwarding privileges, set up the issue states and workflow, create GUI forms where necessary, and click and unclick myriad check boxes. There's a lot to learn here, but once mastered, DevTrack offers the

administrator a lot of power and flexibility.

Speaking of administrators, the approach DevTrack takes most certainly makes the title "project administrator" more suitable to project managers than programmers, which is a very good thing. As a programmer I was almost longing for a Perl script (I said almost).

WORKFLOW, NOTIFICATION, ESCALATION

One of the nicer features in DevTrack 6 is the visual workflow tool. The workflow defines what various states an issue can be in and what can be done next. A workflow is represented by a directed graph, with the nodes (boxes) representing what state the issue is in and the edges (arrows) representing the possible next states for the issue.

The administrator can lay out the workflow visually and then select the individual graph nodes or edges to set up rules for that state or transition.

New to version 6 is the notion of transition-based workflow. By selecting an edge in the workflow, you can create rules and a custom form for advancing the issue between the connected states. This form shows up as an action tab when viewing the issue from the user's perspective in the client, so all the

DEVTRACK 6.0



STATS

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www.techexcel.com

PRICE

DevTrack Standard Edition: \$2,000 server fee. User licenses begin at \$500 per user.

SYSTEM REQUIREMENTS

Windows Client: Windows 95/98/NT/XP; PC with 128MB memory and 200MB free disk space.
Web Client: Internet Explorer 5 or above, Netscape 6.0 or above, Firefox 1.0.
Server: PC with 256MB memory and 500MB free disk space; Windows NT or Server; Microsoft Internet Information Server 4.0 or above.
Supported Databases: Microsoft SQL Server; Oracle; MySQL; Microsoft Access; other ODBC compliant databases.

PROS

1. Scalable.
2. Easily set up and managed through GUI interface.
3. No programming required.

CONS

1. Server programs and native client for Windows only.
2. Some interfaces just a bit awkward.
3. No ability to program directly.

possible next steps for the issue are immediately apparent and accessible.

In my opinion, the transition-based workflow feature makes good intuitive sense and is a big step forward over version 5. Additionally, the new version supports multiple workflows in one project, which lets the user create different workflows for different kinds of issues.

Another solid feature is support for issue notification. Issue notification, as the name implies, is used to send messages, such as emails, to all appropriate users when issues are created or change. New to version 6 is the ability for developers to “subscribe” to issues for notification. By doing so, a developer is notified when any change is made to an issue included in his or her personal subscription list. The administrator is free to either require these notifications or allow users to opt in or out through subscription rules.

What happens when an issue sits idle, you wonder? DevTrack 6 also has an issue escalation, which can be set up to nag users or tattle on them to managers (again, via a specified notification method like email) when no action has been taken on an issue for certain period of time, as defined by the administrator.

CLIENT SIDE

On the client side, individual users have two choices. There is a Windows-only native client application and a web-based client, which should work if you’ve upgraded your web browser any time in the last six years or so.

Your first view of an open project is the main view. The configuration is immediately very familiar, with a tree controller on the left, a list of issues on the right, and a toolbar at the top. The tree shows the sub-projects defined by the administrator for the current project. When you click on a sub-project, every issue in that branch of the tree is displayed on the right, filtered by the query in the toolbar. If you click on the root of the tree, every matching issue is displayed. This is all pretty straightforward and easy.

The information presented when viewing an issue is a bit more complex. There are various “issue detail” property pages or sections that may be visible, depending on how the project manager has set up the

project and how the user has customized his or her client. Some of the various items available are Description, Current Status, Tracking History, and Owner and State Change History, all fairly standard features of most bug-tracking software systems.

Attaching documents to an issue is pretty easy; you add a note, and then browse for the attachment. A screen shot utility has also been provided that simplifies screen captures by automatically opening the screen image and providing some basic tools for annotating and marking up the image. There is no need to open an application (such as Photoshop or Paint) to paste your captured image into. This is a minor addition, but is a good indication that DevTrack is interested in efficient workflow.

Invisible to the user, the documents are handled by a separate server program, which can be moved to its own machine if the load gets too heavy.

DevTrack provides several options for adding text annotations to an issue: description, work description, forwarding notes, notes, and attachments, although some of these functions were a bit confusing at first. For example, should I have the “attach forwarding note to work description” box checked? Should my comment be called a “description,” “work description,” or “forwarding note?” If handled improperly, all of this flexibility could sacrifice clarity.

The Owner and State Change History panel tracks the issue’s transitions in the workflow. While this information is clearly useful, the graphical display is a bit bulky and unnecessary in my opinion. An issue that gets batted around a fair bit might be better displayed in a log style.

All else aside, it didn’t take very long to get used to using the client, and before long I had taken several entertaining fake issues through the workflow graph and out the other side.

FITTING DEVTRACK INTO PRODUCTION

The folks at TechExcel actually have other “application lifecycle management” packages that can be integrated with DevTrack, such as DevPlan for project planning and tracking, and DevTest for managing and executing your test plan. If you’re looking to add other solutions such as these, DevTrack should be on

your list of tools to evaluate, since you’ll benefit from the easy integration between TechExcel’s suite of solutions.

DevTrack 6 offers integration with some source control systems, such as Perforce, Microsoft Visual SourceSafe, ClearCase, PVCS, and CVS. Depending on which solution you have, you may not need the DevTrack client open to perform many operations. Based on a preliminary look into this feature, integration with Perforce seems the most comprehensive.

In DevTrack 6, there’s really more for a product manager to love than a programmer, artist, or other game developer. But everyone should know that accountability and good systems for managing and enforcing accountability make for higher-quality products.

DENNIS CROWLEY is a CG and game programming consultant and mercenary in the greater north-of-San Francisco region. He likes to hang out where art, science, and engineering intersect—that’s where the action is. Email him at dcrowley@gdmag.com.

3D GAME TEXTURES BY LUKE AHEARN

Review by Bijan Forutanpour
A RECENT TRIP TO MY LOCAL BOOKSTORE enlightened me to the fact that there is a glut of books about Photoshop. Many of them aren’t so much educational as they are eye candy, with bright glossy covers and titles that use words like “secrets,” “tricks,” “cheats,” “magic,” or “wow.”

What separates *3D Game Textures* from the mob is its explicitly stated, extremely directed focus on a very specific topic for a specific industry. It does not focus on the entire discipline of game texturing, nor does it discuss texture creation for 3D characters. Instead, it only covers game textures for 3D environments—or to be even more precise, environments that will be used in games that contain sci-fi, fantasy, urban, or outdoor settings.

Four out of nine chapters cover basics and fundamentals, so although the book claims to be targeted toward game

BOOK REVIEW



STATS TITLE

3D Game Textures: Create Professional Game Art Using Photoshop

AUTHOR

Luke Ahearn

Published 2006
368 pages
ISBN: 0-240-80768-5

PRICE

\$49.95 (paperback)

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www.focalpress.com

developers, it is really much better suited for students or artists who currently work outside our industry but want to break into games.

Author Luke Ahearn covers texture creation for game effects, namely, textures for particle effects, weapon blasts, and different simulated lights, such as shafts of light or a glowing candle.

What's most valuable about the title is its step-by-step, detailed tutorials for creating material textures. For example, for sci-fi settings, Ahearn focuses on metals: industrial metals, brushed metal, tiling metal sheets, grates, vents, panels, pipes, brackets, grooves, diamond plate patterns, and grungy overlays to dirty them all up and add realism.

A chapter on urban environments covers what steps game artists must take in creating tiling brick-and-mortar wall textures, paned glass windows, wood planks for walls, wood crates, five different types of concrete, and decaying doors and doorknobs. Although these are fundamental materials, the results are realistic, and the examples do come together to create a very respectable warehouse of skills any game texture artist would be proud to own.

The chapter on fantasy environments discusses in detail more medieval textured surfaces and objects, such as stone flooring, stone walls, rough wood beams, cracked stucco, and the base metals such as dark iron, dull silver, and gold. No medieval room is complete without iron candlesticks, a glowing gem, a worn parchment map, stained glass windows, and a fringed fabric banner. All these materials are covered in great individual detail, some requiring as many as 45 steps to create using Photoshop.

Most examples can be completed in about 10 steps, but quite a few take 20, 30, or even 40

steps. Working through all the examples in the book takes time, dedication, and commitment, but the skill and understanding achieved at the end is well worth the effort. The only way to learn is by doing, and this book lights the way.

One thing I realized (with shock) after reading several chapters of the book was, "I don't need any drawing skills to be a game environment texture artist!" since most of the textures can be created using Photoshop's Render Clouds, Noise, Bevel, Emboss, Glow, and Shadow. Very little actually drawing was done using the pen or brush tool.

By no means is creating high-quality textures straightforward or simple. It is a creative process requiring an artistic eye. But it hadn't occurred to me that drawing skills are literally not required to be considered an artist. There's something very disconcerting about that. If I cut and paste C++ code, does that make me a programmer, too?

Unlike other chapters, Chapter 8 ("The Outdoor Setting") lacked step-by-step instructions for creating textures found in nature, like tree bark, leaves, rocks, mountains, skies, and lakes. Instead, Ahearn advises that these assets should be photographed, not drawn or painted, suggesting that some game artists should work as if they were texture DJs, sampling and combining existing elements to create something totally new. If Ahearn's advice to "take a picture" had been applied to his other environment chapters, it would have made for a very brief book.

Appropriately, a DVD accompanies the book, providing many useful textures—most of them photographed and not created from scratch in Photoshop. There's also a trial version of Photoshop CS2 and Genetica 2, a texture editor (see the May issue of Game Developer for a review of Genetica 2.5 Pro).

Any texture DJ currently working in the game industry had better already know and have demonstrated knowledge of everything covered in this book in their demo reel or portfolio—and drawing skills to boot! ❖

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» **RIGHTLY OR WRONGLY, MOST THEATER CHAINS HAVE DECIDED** that moviegoers don't mind being subjected to 10 or 15 minutes of commercials before the film begins.

Game publishers, on the other hand, are still a bit finicky about inserting ads into products. While a new revenue stream is always welcome, their customers aren't paying \$10 for a ticket, but as much as five or six times that for a great gaming experience.

Nonetheless, an increasing number of publishers are convinced that there's no harm in placing appropriate ads in the right sort of games. (An anachronistic ad for Coke in a medieval RPG, for example, would not be considered "appropriate.") These publishers believe that the ads won't offend players and, in fact, can enhance a game's level of realism if done correctly. Besides, with the ballooning cost of game production, ads help to offset a bit of the expense.

Currently, three companies—Massive Inc., Double Fusion, and IGA Worldwide—are elbowing their way to the forefront of this leading-edge business. All three companies recognize that servicing commercials into games has become a much more dynamic process than what it was even two years ago. No longer do game developers need to create static billboards onto which advertisers' messages are permanently affixed. Instead, companies can run advertisements for specified periods of time, buying advertising time in video games just as they would on television or radio. A commercial for a particular product, for

example, can be set to appear only during that product's larger media campaign and not a second longer. Advertisers can also target their in-game campaigns geographically as well as demographically.

Publishers that are seeking the best ad-serving company for their needs face no simple decision when choosing one over another. Why NCSoft has chosen Massive, for example, while Midway has opted for Double Fusion are questions best answered by the publishers themselves.

MASSIVE: FULL-SERVICE, TURNKEY OPERATION

With its launch of *AUTO ASSAULT* in April, Austin-based publisher NCSoft is officially sticking its toe in the water and doing its first test of in-game advertising. It claims to have no large revenue expectations—just a strong curiosity about how players will react to ads dynamically placed in its new, online, multiplayer RPG racing game, which "has the perfect landscape to give this concept a try," according to Dorothy Ferguson, vice president of sales and marketing at NCSoft North America.

Ferguson believes that certain games, particularly sports and racing titles, lend themselves well to advertising because the ads make the environment look more realistic.

"Our agreement with Massive is only for *AUTO ASSAULT*, and under it, we—and NetDevil, the developer—will be able to ensure that any ads placed enhance the real-world look of the

PAUL HYMAN was the editor-in-chief of *CMP Media's GamePower* and currently writes a weekly column on the video games industry for *The Hollywood Reporter*. He's covered gaming for more than a dozen years. Email him at phyman@gdmag.com.



Massive serves U.S. Navy advertisements in Ubisoft's *SPLINTER CELL: CHAOS THEORY*.

game," she says. No implementation date has been set yet, and Ferguson says she intends to "take the time to make sure that whatever we do doesn't feel intrusive to our customers."

But Ferguson won't say why NCSoft chose Massive over either of its two largest competitors, other than to note that "Massive was very flexible with our creative needs in making sure that anything we do in the *AUTO ASSAULT* game world enhances that world rather than detracts from it."

In addition to NCSoft, Manhattan-based Massive seems to have racked up the heftiest number of publishing clients of any company of its kind. The largest of the 38 include Atari, Eidos, Konami, Sony Online Entertainment, Take Two Interactive, Ubisoft, and Vivendi Universal. Its portfolio of more than 60 "blue-chip" advertisers include 20th Century Fox, Coca-Cola, Honda, NBC, Nokia, Panasonic, Paramount Pictures, T-Mobile, and Warner Bros. Of the 58 "live" games on the Massive system, some of the highest-profile titles are Funcom's *ANARCHY ONLINE*, Vivendi's *SWAT 4*, Ubisoft's *TOM CLANCY'S SPLINTER CELL: CHAOS THEORY*, Sony's *MATRIX ONLINE*, and Atari's *ROLLERCOASTER TYCOON*.

Its most recent coup was signing 2K Sports' *MLB 2K6*, the first major sports title in the Massive Network.

Live for over a year now, Massive bills itself as a full-service, turnkey solution for game publishers.

"What attracts the big advertisers and the big media dollars is the size of our video game advertising network," says CEO Mitch Davis, "and our very experienced group of ad sales, creative, and Q/A people who know exactly how to generate, develop, and deliver a high-quality, in-game advertising experience to gamers."

At the moment, "state-of-the-art" for Massive constitutes its ability to deliver 2D images as well as 10- and 15-second videos to a game, usually to in-game billboards and posters.

"We also have the ability to do 3D object replacements which could, for example, change a car model within a game in real time," Davis notes, although the company doesn't plan to implement that technology for another year or two.

"Gamers are both technically savvy and somewhat cynical, and we want to make sure they have a positive reaction to the technology. The ads have to be additive to the gameplay experience, not a distraction or an interruption. That's the key mantra in everything we do. And we have research that shows that gamers have a 92 to 93 percent approval level of the ads in the games in our network," Davis says.

While convincing advertisers to buy time in a non-traditional medium like video games had been challenging for all three companies, Massive believes that's no longer an issue.

"Uppermost in the advertisers' minds is to follow the eyeballs," he explains. "In the popular 18- to 34-year-old male demographic, that means moving from TV and other traditional media to video games. In the U.S., the average nightly TV viewing time for that demographic is down to 27 minutes while gameplay, certainly in our network, is running an average of nearly two hours. That's four times longer than they watch TV. And so the big advertisers all want to know how they can get into games."

But, says Davis, the advertisers are principally looking for two things. First, they want to buy a network in the same way that



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often, Davis assures customers that, as of the second quarter, Nielsen Media Research will provide reach-and-frequency data.

"Because we have client-side technology in the games, reach-and-frequency can be measured very accurately," he says. "Data can be independently ordered from the Audit Bureau of Circulation, so I think we've solved those basic auditing issues that once were a hurdle for advertisers."

DOUBLE FUSION: GAMES, NOT NETWORKS

If NCSoft was convinced that it made the right decision by signing Massive, Midway was no less certain that Double Fusion was the right choice for its money.

"We got some pretty aggressive offers from all three companies," recalls Steve Allison, Midway's chief marketing officer. "In the end, what we liked about Double Fusion was that, rather than build a broad-based network, they handpick fewer titles, but ones that look like they'll be bigger best-sellers. For instance, they looked at our lineup for the next four years and decided that we would have four or five really key titles that they

could really blow out for us. That strategy resonates very well with us."

Allison described Double Fusion as "comparable in a lot of ways to the other guys: Not only do they serve dynamic ads, but their technology lets them change objects, like clothing, which will permit us to sell custom programs to advertisers. I think we'll end up with a lot more revenue from working with Double Fusion."

Although Midway signed on in late February, Double Fusion hasn't yet begun serving ads into its games. Blame it on Microsoft.

"No publisher has been approved yet by either of the two biggest console hardware makers to serve ads into any next-generation console games," reveals Allison. "It's the burden of Double Fusion and its competitors to solve that problem."

While Allison won't discuss the reason for the holdup, other industry observers say that Microsoft is still trying to sort out a policy that works best for them and won't allow ads to be sold into the Xbox 360 platform until then.

Asked to elaborate, Microsoft wouldn't comment for this story. (Sony, the other company likely to have a stake in the matter, has not yet launched its next-gen PlayStation 3 platform and therefore could not comment yet on the matter.)

"Don't let anyone tell you that a decision is imminent," Allison adds. "It's not going to be an easy one. But, in the end, something needs to be decided; companies like Massive and Double Fusion will die without next-gen consoles becoming part of their mix."

Allison believes that in-game advertising will become an increasingly important revenue-generator for Midway as well.

they buy a TV or cable broadcast. Second, they want measurement and accountability of the media.

"You buy the Massive network exactly the way you would buy TV advertising. For example, for a movie that's about to be released in two weeks—like we recently did for *V for Vendetta*—you would run a two-week campaign across all the titles in the network that reach the demographic that the advertiser wants. And for that, you buy impressions; you pay CPM rates [cost per thousand impressions] that are comparable with cable TV."

While Massive currently verifies whom the ads reach and how

IGA Worldwide's ad placement in action.

massively microsoft?

SHORTLY BEFORE THIS ARTICLE WENT to press, Microsoft announced that it has acquired Massive Inc, in a move that the company says "will help deliver dynamic, relevant ads across Microsoft's online services, starting with Xbox Live and MSN Games."

Microsoft's announcement will notably affect the in-game ad market, which has been fiercely competitive to date, with deals with major publishers swiftly expanding, as companies including Double Fusion and IGA Worldwide fight for game market share.

Some questions remain regarding how Massive will interact with other in-game ad firms in serving ads across Xbox Live to the Xbox 360—

which had not been permitted thus far by Microsoft—and if, how, and when third-party ad serving solutions will be permitted for X360 titles.

When *Game Developer* asked Xbox vice president Todd Holmdahl about some of these issues during an interview at this year's E3, he merely indicated that it was too early to say what would happen to Massive's long-term business model and integration plans following the acquisition.

However, Sony Online is one of Massive's most notable customers, and some kind of attitudinal shift seems likely, as many publishers would like to deliver to multiple next-generation platforms, including PlayStation 3. It seems unlikely that

the Microsoft-owned Massive would support a rival hardware platform in a significant fashion.

Massive CEO Mitch Davis clearly says it's business as usual for now, commenting on the deal signing: "Joining forces with Microsoft will allow Massive to deliver even greater benefits for advertisers, game developers and gamers through one of the world's largest, most comprehensive online networks. While our current business relationships will remain in place, with Microsoft we have the prospect of extending our technology into a vast array of new markets and online environments."

—Simon Carless

"As our costs rise, we need to look for other ways to supplement our income. Luckily, our lineup lends itself to in-game advertising because our titles are based on real-world stuff, more so than at a lot of other publishers," he says. "I mean, our characters aren't flying spaceships or riding horses in the Wild West. They're driving real cars, wearing real clothes, and using modern-day items. Two of the games we've announced—THE WHEELMAN and STRANGLEHOLD—plus about seven or eight that we haven't announced, are all really grounded in today. In-game static and dynamic implementations make a ton of sense to us and will become very important."

Allison recognizes that in-game advertising can't go overboard at the cost of alienating players. "We're not going to stop the game between levels and run commercials, and we're not going to put 5,000 billboards in a game," he says. "But we are going to do it like in the movies. We're going to take our blockbuster games, convince advertisers that they're blockbusters, and then ask a car maker to have its newest model be the official car of the game, or see if Samsung wants to have the official cell phone of the game, for example."

Midway currently hard codes static ads and product placements into a few of its games. In NBA BALLERS: PHENOM, for instance, players can spot ads for Sprite, Spalding, and AOL.

"T-Mobile paid us so that one of its phones is the user interface for text messages in the game," adds Allison, "and the characters wear Adidas clothing. But all that makes sense in BALLERS; it's not excessive. It's not like putting a billboard for Pepsi in MORTAL KOMBAT, because that wouldn't make sense."

Similarly, in LA RUSH, Midway saw revenue from Castrol Motor Oil, Yahoo! Music, MTV, Armor All, Axe Body Spray, and iRiver.

Allison estimates that when Midway's games eventually include dynamically served advertising, he will be lucky to make \$1 million per title. "That would be a great success," he says. "Look, I'll be the voice of reason. If we have 10 titles in any given year that contain the ads, maybe we'll get \$10 million in in-game ad revenue. To put that into perspective, next-gen games are going to cost us between \$12 million and \$19 million to make, so the ads might save us 10 percent of our costs. That's not a lot, but it's nothing to sneeze at. It is what it is."

In addition to signing Midway, Double Fusion has also brokered deals with THQ and a few smaller publishers, such as Crave Entertainment, and developers like Rebellion and



Metro3D, both in the U.K. On the advertising side, clients include Procter & Gamble, Unilever, and Habbo Hotel.

Confirming what Midway believes is the differentiator between Massive's and Double Fusion's services, Jonathan Epstein, who was recently appointed chief executive officer of Double Fusion, notes that his company "sells the publisher's game, not our network."

"We believe that networks are bad for premium games, that they don't represent the brands well, and that they tend to subordinate CPMs on a sort of lowest-common-denominator basis," he explains. "We're not focused on locking up hundreds of a publisher's value-priced titles. We're focused on selling premium title by premium title to the specific advertisers that matches those titles, which is exactly what the advertisers are looking for. That's where you can command the highest value to advertisers and therefore revenue to publishers."

He believes that some publishers have signed on with Massive—which launched its network with its first client in April 2005—only because "they were the only game in town for a little while." But since Double Fusion went live in the U.S. at the end of 2005, he says that has changed.

Double Fusion's biggest challenge, says Epstein, has been to educate advertisers about where to place the ads. "For example, we discuss with them about advertising in shooters, which contain a certain amount of violence," he says. "That's a predominate genre among gamers, and advertisers need to come to understand what gamers like and what they don't like. I mean, sports games are great—and safe—but what about popular games like COUNTER-STRIKE and UNREAL and WORLD OF

WARCRAFT? They may be violent, but there's plenty of product placement in violent movies, and much of what drives TV advertising revenue are shows that run after 10 p.m."

A second issue, says Epstein, is how in-game advertising should be measured, priced, and audited.

"Right now, our industry doesn't have a consistent third-party measurement standard. That's something that needs to evolve, and it is evolving ... and will be an important breakpoint in terms of accelerating spending into the market."

IGA WORLDWIDE: PC, CONSOLE, AND (COMING SOON) MOBILE

IGA Worldwide launched its network nearly as recently as Double Fusion—only late last year in September, with CUSTOMPLAY GOLF. But unlike Double Fusion, IGA takes a network approach similar to Massive's.

"We have agnostic relationships with the publishers and we aggregate the games together in a network thereby providing a mass-reach medium for advertising clients," explains CEO Justin Townsend. "Our PC technology is up and running and we have games within the network. We're actually working on the



console technology right now, and we've just introduced the mobile technology, so that will be going to market very soon."

IGA Worldwide's list of publishing clients includes Atari and Merscom in the U.S., Bongfish in Australia, Nadeo in France, and CustomPlay Games in the U.K. Ads from such brands as Red Bull, T-Mobile, FHM, Orange, and Ben Sherman are served into such

CONTINUED ON PG 47

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EDGE OF THE WORLD

ESTIMATING AND MAXIMIZING STREAMING BANDWIDTH

» **STREAMING IS QUICKLY BECOMING A FEATURE THAT'S EXPECTED** of console titles. While players were willing to accept loading screens during the early days of CD titles, several blockbusters have shown them that it's possible to have a quality cinematic experience without interruptions.

Rather than saturating the market, the growing number of streaming games has only increased consumer demand. In many genres, loading screens and discrete levels simply do not compare to an expansive and continuous world. Seen by both players and the media as a key feature, a well-executed streaming system can drive sales, too.

Unfortunately, creating a streaming system is complicated, risky, and requires more planning than a traditional loading scheme. And implementation presents a host of well-known problems, many beyond the scope of this article.

The focus of this article is extracting as much performance as possible from a drive. Optical drives in modern consoles have not kept pace with increases in system memory and CPU power. For example, the Xbox 360 has eight times the memory of the original Xbox, but a DVD drive that is only about two or three times quicker. Filling available memory on the Xbox 360 actually takes longer than on the Xbox, and it's too early to tell if the PlayStation 3 will be any better. Data sizes have grown to fill available memory, but the drives

can't keep up. As a result, data throughput is a significant limiting factor for most streaming games. It takes a combination of several tactics to overcome these limitations.

EFFECTIVE GLOBAL DATA

Putting more of your data into global memory means there's less data streaming from the disc. Since memory is always limited as well, choosing the right global assets is a little more complicated.

Streaming data can provide diversity in the world, while global data can keep the world functioning. The goal is not to eliminate streaming, but to use the limited available bandwidth more effectively. A quick rule of thumb is if the data is in use more than 50 percent of the time, it should be classified as global.

It can be tempting to fill global memory with textures, but for many games that's not the best approach. Quite often, designers and artists want different areas of the world to look unique, which means objects share fewer textures.

Global textures should be limited to those that are used repeatedly. For a game in an urban setting, globally stored textures might include asphalt, brick, concrete, and grass. If a texture is only used in one part of the world, allocating it to global memory simply wastes space the majority of the time. If a specific building or sign is used in only one location, it should be dumped when the player leaves the area. High-resolution

BRAD BULKLEY, a lead programmer, has worked at Neversoft since 2001. He learned his skateboarding lingo while developing *TONY HAWK 4*, *THUG*, *THUG2*, and *AMERICAN WASTELAND*. He earned his spurs while making *GUN*. Email him at bbulkley@gdmag.com.



EDGE OF THE WORLD

renderable geometry falls into the same category. It's rarely used, so keeping it in global memory is unnecessary.

One way to keep your environment rich while minimizing the impact on global memory is to load reduced level of detail (LOD) geometry and textures globally. At any given time, only a small portion of the high-resolution data needs to be loaded, usually in an area surrounding the player. Everything else can be represented by the reduced LOD geometry and textures, giving the player the illusion of a much richer environment.

Allocating this data to global memory means that when the high-resolution data is unloaded, the reduced LOD assets appear instantly. Likewise, if the high-resolution geometry is streamed in before the player gets too close to the LOD geometry, the "pop" from low-resolution to high-resolution will be minimal. Viewed from far away, like when the player stands atop a mountain and scans the horizon, the landscape looks like a completely persistent world. The reduced LOD data allows the game to draw large portions of the world using very little memory and a relatively low poly count, so the game benefits from both memory savings and the heighten the illusion of a richly populated world.

Objects that belong to non-player characters make up another type of data that can be moved to the global memory, but for different reasons. If the objects are associated with other streaming data, they can be unloaded at any time. Of course, one of those times could be when the player is looking directly at a NPC, in which case the object would simply disappear.

If NPCs are global, they can exist in any part of the world at any time. Another concern is AI navigation. If in-game pedestrians use special data, such as a navigation mesh, to navigate the world, that data could also be unloaded at any time. Rather than breaking navigation when sections unload, you can make these assets global, which gives designers and AI programmers more freedom and allows computer-controlled characters to navigate any location in the game.

There are other, smaller assets to consider allocating globally as well. Most sound effects associated with core gameplay mechanics don't change, so there's no need to unload them. If anything, only unload sounds associated with a particular section of the world. If there are one or two sets of sky textures and geometry, think about keeping them global. Other than cutscene animations, the vast majority of character animation data should probably be global, too. When combined, all this globally allocated data can have a sizeable impact on the amount of streaming data.

One exception to the rule is collision geometry. Collision geometry that is on the other side of the world isn't in use—so why keep it loaded? In any streaming game, it's unavoidable that some players will outrun the streaming system. The system might fall behind because it's having trouble reading a dirty disc, or because the player finds an unplanned shortcut, or because an older disc drive experiences unpredictable drive errors. It's impossible to prevent, but when a player reaches the end of the loaded world the game should recover gracefully. In such an emergency, the global LOD data can be used as a substitute for

In this scene from the game GUN, LOD geometry is used to represent distant buildings and mountains.



the high-resolution data. It won't look good, but the player can still recognize all the major features. However without collision, the situation is much more serious because the player can't interact with the world at all. With global collision, the game continues to function while the streaming system attempts to catch up.

ESTIMATING TRANSFER RATES

Obviously, carefully chosen global assets are not a panacea; some data needs to stream from the disc. Despite the lackluster performance of modern drives, they are a critical system resource, particularly in streaming titles, and as such, they should be used to their full potential. The actual throughput is determined by the hardware, but a number of things can be done to increase the effectiveness of the throughput.

To minimize the effects of slow transfer rates, you can write the data to the disc in a compressed format, thus trading CPU time for a more effective throughput. While the added time for decompression must be accounted for, it is still faster than reading uncompressed data.

Compressing data has another benefit: reduced seek time. A streaming game will typically need several files at a time. If these files can be compressed into one, the drive doesn't have to seek out each individual file.

Game design plays a significant role as well. The speed of the main character will determine how quickly new geometry needs to appear. The character's speed is likely to change during the project, but a safe upper limit can usually be established early. This in turn

establishes a maximum time the system can use to grab new data from the disc, decompress it, and perform any necessary processing. These three factors—transfer rate, decompression rate, and the time permitted to load new data—form the basis of an equation for the maximum total data size. See Equation 1.

The equation is somewhat oversimplified, but it can provide useful estimates. Also bear in mind that this equation provides theoretical maximum values. It would be wise to include a 20 percent margin of error in the final budget (this should be applied after solving the equation to avoid compounded error).

Two of the values are largely determined by the game's design and memory map: the maximum time permitted to load new data and the maximum data size. Design priorities and system resources will typically limit one or both to a specific range. These are the values most likely to change over the course of development, and modifying them will become a primary tool for managing bandwidth.

While the data setup time might not be trivial, it's generally small



FIGURE 1 Transfer rates are expected to increase linearly as disc position changes. Real world tests prove otherwise.

compared to the transfer time, which depends on how much runtime processing must be performed on streamed data, hopefully very little. The decompression rate (the speed of the decompression algorithm) is somewhat variable, but provided the algorithm is mature and not grossly inefficient, it is unlikely to change. The average transfer rate is determined by the hardware, but obtaining an exact figure is not as simple as checking the manufacturer's specs.

ESTIMATING AND TESTING AVERAGE DRIVE PERFORMANCE

One of the advantages of console development is that specifications don't change, or at least that's the theory. Unfortunately, it's not true for drive performance. During the lifecycle of a home console, manufacturers will use parts from various suppliers, resulting in subtle but important differences.

The first PlayStation 2 consoles manufactured had different drive characteristics than one you would purchase in stores today. An individual console won't necessarily have consistent performance either. If a console is subjected to years of abuse, it might suffer from mechanical wear or dirty moving parts. A read head sliding on a worn and dirty track is likely to have a longer seek time than a new unit. A dirty lens can cause more read errors than normal, yielding lower transfer rates. And some drives deal with scratched discs better than others.

To further complicate matters, the development and debug kits used during production often have little in common with retail units. The PlayStation 2 TOOL has a different DVD drive than the test kits, and both have different drives than retail units. Japanese and American dev kits have also been known to perform differently.

The Xbox and Xbox 360 have disc emulation capability, but if a game is developed for multiple platforms, chances are at least one will not have an emulator. Equation 1 can't be solved without a known transfer rate, so what can be done? In this kind of situation, there's no substitute for hands-on testing, so start gathering several sample units: old, new, debug, retail, and

$$X_{MB} \left(\frac{C}{T \frac{MB}{S}} + \frac{1}{D \frac{MB}{S}} + \frac{1}{P \frac{MB}{S}} \right) + S_S = Y_S$$

EQUATION 1 (above) where:

C=compression ratio

D=decompression rate (MB per second)

P=data setup time (MB per second)

T=average transfer rate from disc (MB per second)

S=total seek time during transfer (seconds)

X=maximum data size (MB)

Y=maximum permissible time to load (seconds)



EDGE OF THE WORLD

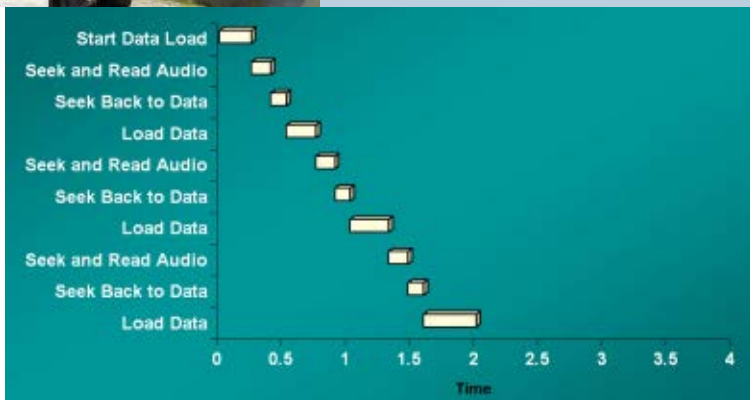


FIGURE 2 Servicing audio streams can have a significant impact on total transfer time.

development kits. Ask the Q/A department if any of their units have slow drives. If your game will be shipping in other parts of the world, try to obtain units from each of those regions. Burn test discs and record their performance in different machines. The results can be surprising.

With optical drives, it's expected that data closer to the edge of the disc will have a better transfer rate, although this is not always the case. The only reliable way to predict real world drive performance is to test several burns, each with the data in a different spot. Figure 1, which is based on data obtained with a popular console, shows that discs do not always behave as expected.

It's clear in Figure 1 that performance is not linearly related to physical position on the disc. Transfer rates increase faster than expected until they quickly drop, well before the physical edge of the disc. In order to achieve the best transfer rates, data must be carefully positioned at the edge of this drop-off.

Data sizes can change daily, so it's a good idea to write a tool that analyzes the size of the data and places the most critical files in the fastest section of the disc. As much as possible, this tool should also order files in the same sequence they are read. Adjacent files mean less seek time. Such a tool will save hours of headaches late in the project when reliable burns are needed the most.

Testing burned discs will give you a good estimate of final performance, but there's one important thing to remember: DVD-R performance is different than DVD-ROM. Few developers can afford the high cost associated with manufacturing a batch of DVD-ROMs. Luckily, a retail DVD-ROM disc should perform at least as well as a DVD-R.

CALCULATING TOTAL SEEK TIME

At first glance, calculating the total seek time seems to be straightforward: just check the specifications for the drive and move on. Assuming all necessary data files are compressed into a single file, it should take only one seek to find the file and start



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reading. However, most games use some form of streaming audio, and servicing these streams could mean several interruptions during the data read. If multiple audio streams need updating while the game is trying to load other data, seek times can quickly add up.

For example, if game on the Xbox 360—which has a one-way seek time close to 0.115 seconds—has a music track, an ambient track, and an audio stream, the load being placed on data throughput could be significant. See Figure 2.

The case shown in Figure 2 adds nearly 1 second to the streaming load, a long time for most streaming games. Depending on the size of the audio buffers, that additional second increases the chances that two audio updates will happen, creating a dangerous waterfall effect. In such instances, servicing audio streams can easily double the amount of time needed to load other data.

One solution is to create a priority system for audio streams. High priority streams such as music will always update, but lower priority streams are allowed to cut out or fade. This trick will improve both the worst case and average case scenarios, but for the purpose of Equation 1, the worst case should be used.

Also remember that the hardware doesn't always read data in the most efficient manner. If the low-level file system is servicing two or more read requests, it may decide to seek back and forth, reading only small chunks at a time. Setting strict

budgets for the number of concurrent reads minimizes the chance that the hardware will do something inappropriate.

If the game uses more than one layer of a disc, make sure all data accessed during streaming is on the same layer. The time taken for a layer switch is far greater than a seek and should be avoided at all costs. Use the other layer for movies and global data if necessary.

PLAN AHEAD

Making a streaming game isn't easy, and thorough planning is essential. Most of the data budgets in a streaming game—textures, geometry, collision, animations, and sound effects, for example—completely depend on an accurate streaming bandwidth budget. An inaccurate budget can spell disaster for a project, and it might not become apparent until it's too late. As the project nears completion and data grows to fill its allocated memory, a poorly designed streaming system can fall apart, severely delaying the schedule.

Careful planning at the beginning of a project, while time consuming, is vital. Even though streaming bandwidth is only one facet to a very complex problem, thinking through the issues beforehand will make it easier to see the big picture, hopefully while there's still time to change budgets, fine-tune schedules, and adjust the feature set. ❌



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Making INDIGO PROPHECY was all that. The adventure forced me to think about my vision of the future of this medium and how to evolve it, which sometimes means remaining true to the medium's still-young traditions, and other times breaking away from them.

WHAT WENT RIGHT

1 CREATING EMPATHETIC CHARACTERS. Characters were central to drawing players into the narrative. From the onset, I set out to build empathy between the player and the main character, without the player realizing it was happening.

At the beginning of INDIGO PROPHECY, players take on the identity of Lucas Kane, a man who has just woken up to discover that, unbeknownst to him, he has murdered someone. The idea that the hero is a murderer in spite of himself generates instant sympathy from the player. The stressful situation imposed from the very

beginning immediately plunges players into the story and makes them Lucas Kane's accomplice.

I had to fight the marketing department on this point, as they were convinced that the player would not feel empathetic toward a murderer, which thankfully proved to be wrong. The narration enabled us to get over this difficulty without any problem.

I still had to convince the player to take an equally rapid interest in the other characters though. In addition to Lucas Kane, the player can control two other main protagonists: police officers Carla Valenti and Tyler Miles. My goal was for players to have no favorite character, but to be equally pleased each time they encounter any of the three.

The characters were all built on classic archetypes. Carla is a tough, young police officer, but is discreetly sexy and totally immersed in her work to compensate for the lack of any emotional life. Tyler Miles is a cool, young, black cop who is sincerely attached to Carla, full of humor, but serious in his work.

These stock character traits enabled us to present the characters quickly while giving players the impression that they had always known them.

The danger of using archetypal characters is that they can easily become caricatures, in which case the story loses all credibility and players lose interest.

To avoid this, I enriched the initial archetypes to give them more depth. For example, Lucas Kane has self-doubts and has a complex relationship with his brother, a priest. Carla suffers from claustrophobia and chronic anxiety. Torn between his strong sense of duty and love for his girlfriend, Tyler is in a complex relationship.

DAVID CAGE is CEO of Quantic Dream, which he formed in 1997 after five years in the music industry. He is currently focusing on next-generation consoles and the potential for expression of human emotion through hyper-reality. Contact him at dcage@gdmag.com.

GAME DATA

DEVELOPER
Quantic Dream

PUBLISHER
Atari

PLATFORMS
PC, PlayStation 2, Xbox

RELEASE DATE
September 16, 2005 (EU/U.K. as
FAHRENHEIT)
September 26, 2005 (U.S.)
January 26, 2006 (Japan as FAHRENHEIT)

NUMBER OF DEVELOPERS
Around 80

LENGTH OF DEVELOPMENT
Two years



OPHECY

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EVI



INDIGO PROPHECY's action sequences give direction with indicators that were supposed to lie in players' peripheral vision.



2 RECONCILING NARRATION AND INTERACTION. One of the key design points in INDIGO PROPHECY is to get interactivity and narration to work together. Most games oppose these two concepts, or rather, they develop them in turn—a cutscene to advance the narration, then an action scene, then another cutscene ... a structure very close to that of porn movies.

A large part of my work consisted of reconciling these two pieces, first by eliminating the dichotomy from the design. More often than not, it's the game designer who establishes the gameplay mechanics. The screenwriter is only then called in to find a story that links all the levels.

More than anything else, I wanted to break from this logic by designing the story and the interactivity simultaneously. My aim was to allow the player to "play" the story, to enable it to progress directly through player actions rather than jumping from cutscene to cutscene. It was difficult to find a solution to this problem, particularly because it demanded that each scene contain an interesting proposition in terms of scenario and gameplay.

One scene in particular was a veritable revelation for me: when Tyler wakes up in his apartment at the start of the game. The player shares in Tyler's morning routine, showering, getting dressed, drinking coffee, listening to music, having a serious discussion with his wife and kissing her before taking his coat and setting out for work.

When I wrote that scene on paper, I spent entire nights in a cold sweat. What was the player going to *do* in the scene? Where were the mechanics? Why would such a scene be even slightly interesting in terms of gameplay?

After months of soul-searching, I was very surprised to finally see the scene assembled, with dialogue, animation, music, and directing. Shockingly, it worked. It wasn't based on traditional games mechanics (objective, obstacle, ramping, reward), but on something else that I still find hard to define.

The scene is based entirely on the interest of sharing in the character's personal life, developing an attachment to him,

becoming slowly immersed in his story. No stunts, no artifice, just "being" a character in a simple context. That scene finally convinced me that it's possible to create an interesting experience without weapons or cars.

3 KEEP THE PLAN BUT BE READY TO CHANGE IT.

I always have very detailed and complete game designs before beginning production. The way the game operates is described on paper in the smallest detail, and overall the final results differ little from the initial document. Multi-View and Mental Health are two rare ideas that were born during the development process, but ended up being fundamental.

One morning, a member of the team came in with one of the very first episodes of the TV series 24. The opening scene of one of the first episodes hit me straight away. It showed a character using a computer, with one window showing the screen, another the worried face of the character, and a third revealing a general view of the room.

I was won over by the idea that we could show both the interface and the facial expressions of the person using it. I also quickly saw the full potential of such an interface for gameplay, particularly by showing several places at the same time while leaving the player in control. But convincing the team to implement this multi-view concept was another story.

I have to admit that when I got the idea, the PlayStation 2 engine was running at 5fps with a single set of images. The idea of opening as many as four windows simultaneously seemed like science fiction at the time, not to mention the loading and memory problems that would be involved.

We were then at an advanced stage of development, but being both lead designer and CEO of the company, I decided that Multi-View was going to be one of the key features of the game. Furthermore, it would be essential to adapt the game design, technology, and production in order to accommodate it, which the team accomplished with a lot of work, determination, and faith.

The Mental Health gauge was also implemented during the course of development rather than beforehand. Initially, I thought it would not be necessary to have a life or morale gauge because the player's emotions would be enough, feeling encouraged or demoralized depending on the character's actions.

However, once the game was assembled, it quickly became apparent to me that this was not the case. We needed to demonstrate the character's emotional state in a more concrete form for the player. The addition of the Mental Health gauge was ultimately quite important for the experience of the game, making the psychological state a simple play mechanic that was perfectly consistent with the narrative aspect.

4 VECTORS OF EMOTION. There were three main constituents to developing emotion in INDIGO PROPHECY: virtual actors, motion capture, and facial animation.

Constructing virtual actors was absolutely fundamental to the game's success. From a technical point of view though,



creating virtual actors who are capable of communicating emotion was quite a challenge.

Motion capture was immensely helpful in this respect. Quantic Dream has its own in-house mocap studio, without which INDIGO PROPHECY would not have been possible. In addition to the known difficulties associated with mocap, the main problem I encountered was figuring out how to maintain coherent mannerisms for each character.

For Lucas Kane, for example, the body animation required several actors (adventure, body language, stunts); another actor lent his voice; and a puppeteer was used for the facial animations. It took eight actors total to breathe life into Lucas. And since their performances were staggered over more than 18 months, my job as a director was to keep the animated character's look consistent throughout the game.

The facial animation was also extremely complex. I had experimented with different techniques while making OMIKRON: THE NOMAD SOUL, from facial motion capture to triggering blendshapes with a MIDI piano. Given the quantity of dialogue (about 150 minutes spoken by more than 70 characters) and the level of emotion we were aiming for (entirely mobile faces), we had to find an ideal solution. We finally opted to use "digital puppets."

Digital puppets involve using a glove to capture finger movements, with each finger assigned to a blendshape animation. With two gloves, a professional puppeteer can

control each blendshape dynamically and in real time, combining and blending them in a fluid and natural manner. The puppeteer listened to each line twice, then recorded the animation while viewing the results in real time. The system also allows for retakes, re-recording just a portion of the face.

5 PUBLISHER SHUFFLE. Changing publisher in the middle of development is usually the worst nightmare imaginable. INDIGO PROPHECY is a special case because the developer was the one to ask the publisher to terminate the agreement.

The situation we were in is a classic developer dilemma. First, highly motivated people at the publisher believe in the developer's vision and sign the game. These people either leave or are fired, while the game stays with the publisher. Everything the previous people signed onto is now of no interest to their replacements. The developer is now in a ridiculous situation having signed its game to a publisher that no longer wants it.

INDIGO PROPHECY had reached an advanced stage of development, but no one at the publishers seemed to understand what we were doing. If I were more cynical, I might have rejoiced in the situation, knowing that it was too late in the project for the publisher to kill it. But I was really convinced of the quality of the game and didn't want it to be released without marketing or promotion. Like any developer who sacrifices two years of his life for something he believes



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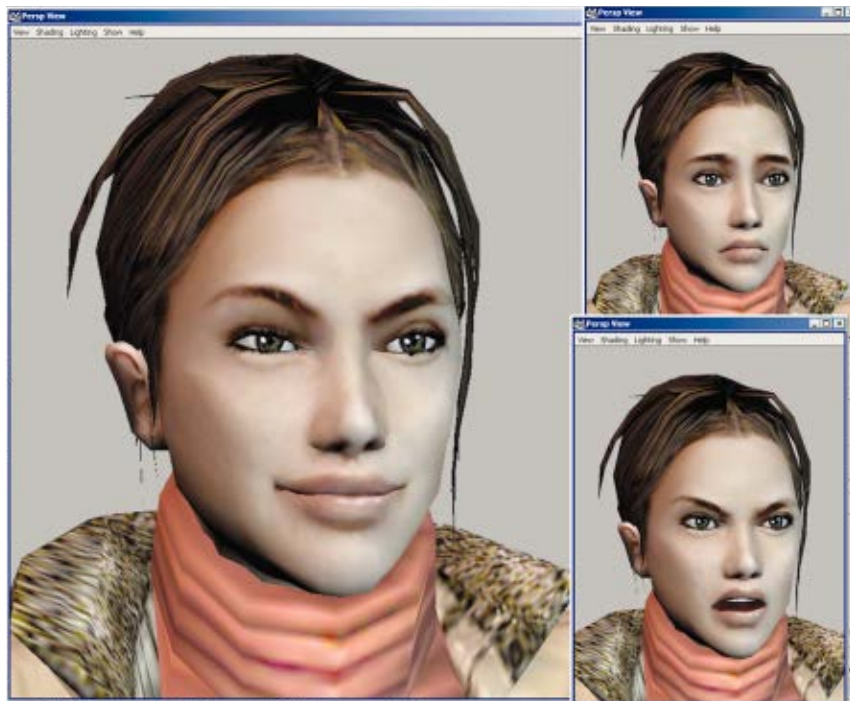
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Puppeteers created facial blend shapes using mocap and dexterous finger movements.

in, I couldn't resign myself to the idea that my game would be released without the necessary support.

I visited the publisher and, convinced of the quality and originality of *INDIGO PROPHECY*, I asked them to give me back my game.

The publisher was intelligent enough to accept this proposition, which thus enabled us to find a new publisher, one who was happy to acquire a cross-platform project in beta, just a few months from the end of development.

Changing publisher was the most positive element in the development of *INDIGO PROPHECY*. We suddenly found people who were enthusiastic about our game and were convinced of its quality. *INDIGO PROPHECY* improved considerably during this period, particularly thanks to the new viewpoint provided by the publisher, which was useful in terms of regulating the pacing of the game.

The conclusion of this experience is that it's sometimes beneficial to change partners when you feel that things have ceased to progress.

WHAT WENT WRONG

1 THE STORY: THE BAD. Generally speaking, the storyline and characterization worked particularly well, but a few glitches in the writing prevented the story from reaching the level of quality I was aiming for.

For example, one bad guy per story is enough. The Oracle is the real enemy in *INDIGO PROPHECY*, and I think his character was realized quite well. But the AI that comes into play at the end of the game only adds confusion to the plot.

You can make people believe anything, given the right scenario, but only once per story. In the case of *INDIGO PROPHECY*, Lucas' being guilty of a murder he never really committed was the one unreasonable proposition, which players accept without difficulty. The series of new developments at the end, although

built into the first scene (the crow representing the AI is a leitmotif throughout the game), constituted a series of added propositions that went beyond what the players/spectators could reasonably accept.

I also did not devote enough time to the last hour of the game. Convinced (and rightly so) that the first hour of the game would hook the player, I naively thought that one hour from the end the player's opinion would be set. I therefore devoted most of my time to the rest of the game in order to make it as perfect as possible.

This was obviously a mistake. I had forgotten that what leaves a lasting impression on players is often the ending, and that a bad ending can change their perception of the whole game.

2 ATMOSPHERIC, BUT NOT STELLAR, GRAPHICS. The game's graphical quality was criticized by some of the game press. This happened for three reasons.

First, *INDIGO PROPHECY* was developed simultaneously on three platforms, PlayStation 2, Xbox, and PC.

PlayStation 2 had been defined as the lead version for the final phase of development, and no efforts were spared for this console. The last months of development were devoted to graphically improving the PC and Xbox versions, but too few specific features were developed for these platforms to make their versions competitive with the best-looking games on the market.

Second, we deliberately chose to work on the graphics in terms of atmosphere rather than in terms of a technical demo. In order to create a grim atmosphere by working on the color and the grain of the image, we intentionally avoided easy lens flare and other environment map effects found in most games. Therefore, the final game lacked some eye candy.

Third, we suffered from a misevaluation in terms of our tool needs. The graphics team did top-quality work, but the tools that would have facilitated the graphical production either appeared much too late in production or were not suited to the job. The nature of the technology always has direct repercussions on the graphical quality of the game. When a graphic artist spends more time trying to view his work than improving it, the result is a loss of quality.

For our upcoming productions, we have devoted significant time to the graphics and animation tools. More specifically, we have greatly extended our WYSIWYG philosophy, enabling direct visualization on console in all tools.

3 ACTION SEQUENCES: ALMOST A GOOD IDEA. The action sequences were good ideas that never fully matured during the development of the game. Reviews were globally good for this part of the game, which was designed from the very beginning more as a spectacular breath of fresh air in the narration than as a veritable gameplay challenge. However, I am personally dissatisfied with the result.

The initial concept was to avoid repetitive action sequences like you find in most games, where the player accomplishes the same actions over and over (shooting, fighting, driving).

The narrative structure imposed a great variety of actions, animations, and situations in order to preserve the cinematic side of the experience. There was no way we were going to insert shooting sequences every 10 minutes at the risk of destroying the narration.



The other important point in the project specifications was that the camera be positioned to provide top-quality directing (no views from behind). Finally, since we didn't want to provide specific interfaces for each new action scene, we had to imagine a generic interface that was equally suited to a chase scene, a game of basketball, or ice-skating.

The result was the MPAR (motion physical action reaction) system (Yu Suzuki experimented with something similar with his Quick Time Events in SHENMUE).

The final idea of assigning controls to the analog sticks and bonding them to the movements of the character on the screen came quite late in development, too late for the appropriate tools to be developed. The implementation was thus very largely blind, and the tuning particularly long and delicate.

In addition, we failed to find an ideal visual representation for the symbols on the screen. We tested a large quantity of positions, sizes, shapes and colors and finally opted for peripheral player vision. It was an interesting option but not entirely convincing, and the interface was graphically too invasive. If the player does not use peripheral vision, the eye moves from the symbols to the scene and the interface masks the scene.

4 POOR VISION FOR THE TECHNOLOGY. In spite of many positive points, the game suffered globally from an insufficient overall vision for the technology. This placed a considerable burden on the development and demanded extra effort that the team could otherwise have avoided.

The first mistake occurred when changing platforms. Developing a PC game is very different from a console game, particularly in terms of memory management, loading and saving. We considerably underestimated the switch from PC to console and failed to identify the difficulties correctly. We quickly focused on the frame rate, whereas the memory and loading issues were considerably more problematic.

The second mistake was an insufficient analysis of the game design. It seemed to be very simple (playing animation in scripts with conditions), but ultimately it required a lot of underlying complexity. We also underestimated the needs of a game that uses few recurring mechanics.

Another classic error we committed was trying to develop generic tools with a view to possible future productions, rather than tools dedicated to the experience of the game we wanted to create. The initial scripting tool was supposed to enable us to script both an FPS and a tennis game. The reality quickly proved to be different from the theory.

A generic tool enables management of a great variety of cases, but none of them very effectively. The prospect of reusing a tool as-is for future productions is usually a pipe dream that costs time and money in the short term, with no guarantee of profitability in the long term.

In INDIGO PROPHECY we realized this early enough to be able to correct the error. We adapted the tool, making it less generic but more effective for the type of game we were developing.

5 PITCHING AN ORIGINAL IP TO PUBLISHERS. I often say that a truly original project will never be signed by a publisher unless a misunderstanding occurs. If the publisher really understood what was being signed, it would never sign it.

The initial presentation of INDIGO PROPHECY was capable of terrifying even the most foolhardy of publishers. The challenge of the project

was to create an experience in which the player controls the main protagonists of the story, and in which the player's choices modify the course of events. No gun, no car, no action, no puzzle.

The first publishers I spoke with took me at best for a harmless dreamer, at worst for a madman. When evaluating a new project, a publisher first looks at sales figures for games in the same category. In INDIGO PROPHECY's case, either the game was a new genre and therefore had no comparable reference, or it belonged in the adventure category, an economically negligible genre. The publisher's first impression couldn't have been positive.

The other difficulty I ran up against was trying to explain the planned experience. To this day, I find it difficult, if not impossible, to explain what the game is to someone who hasn't played it.

Explaining the concept of an original game with no real prior references is a major difficulty that must not be underestimated.



I had to deploy considerable efforts before finally managing to generate enough excitement to sign the project, after spending more than a year discussing it with the publisher.

FINAL DIVINATION

INDIGO PROPHECY was really an extraordinary experience in both professional and personal terms. I learned an enormous amount from it, and it profoundly changed my vision of interactivity. I won't make games the same way after INDIGO, and it also deeply changed the vision of most people on the development team. Although the game might not be perfect, I hope that the passion and enthusiasm that the team and I invested in it will nonetheless make it a game that's both different and sincere.

In my personal development, it constitutes an important step toward making games not just simple toys but a veritable form of expression. I hope it has given other, more talented people the desire to explore interactive narrative and the formidable capacity of this new medium to create emotion. ❖

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Using Verlet physics to simulate blobs

GAMES SUCH AS GISH FROM CHRONIC

Logic on the PC and LOCOROCO from Sony on the PSP use a 2D physical simulation of a blob as the main character. The physics behind this blob provides the basis for the gameplay. Since the focus is heavily on gameplay, the actual physics has very little relation to reality and is not the kind of thing you find covered in books on game physics. This article lays out the basics behind one method of 2D blob physics and discusses some of the practical implementation issues. Full source code and a demo program for a working blob system are available at www.gdmag.com.

MASS SPRING SYSTEM

Both GISH and LOCOROCO use a model that has been used for decades: a “mass spring system,” or put simply, a collection of point masses connected by a series of springs, roughly in the shape of the object you desire. You can think of it like a particle system, where each particle is attached to some other particles by a number of springs. See Figure 1 for a simple example.

A simple spring connects two points and has four basic parameters:

1. the rest length, which is the length of the spring when it is neither stretched nor compressed
2. the minimum length of the spring when fully compressed
3. the maximum length of the spring when fully extended and
4. the force exerted by the spring, proportional to its displacement from the rest length.

Some springs can exert a different force depending on whether they are

compressed or stretched. The force can also vary in a non-linear relationship with the displacement, but for our purposes, the simple spring as just described works well and is easy to use.

A point mass has three parameters:

1. the position in space, expressed as a 2D vector
2. its previous position and
3. its mass.

For most of the blob physics examples presented here, I used a value of 1.0 for all point masses. However, it’s useful to have a per-point mass, as it enables you to easily try various effects. If you end up with all the masses being the same, then you can optimize it out of the computation.

VERLET MADE EASY

Verlet integration is a fancy name for a slightly different way of applying the velocity and acceleration of a point to its position. Normally, a point P will have a position X and a velocity V. Forces act on the particle, namely gravity, air resistance, and the springs. The traditional (non-Verlet) way of updating the position of a particle is to first update the velocity with the acceleration and then update the position with this velocity:

$$F = \text{total of forces acting on this point}$$

$$T = \text{time step to update over}$$

$$V += T * F / M$$

$$X += V * T + F / M * 2 * T * T$$

Generally referred to as Euler integration (with a second order Taylor series correction), you might recognize these equations as the standard Newtonian equations of motion, more usually notated as $v = u + at$ and

$$s = ut + \frac{1}{2}at^2$$

While the term “integration” is technically correct and will lead to a deeper understanding eventually, don’t worry if you don’t follow what is meant by it. Just think in terms of the equations of motion. Verlet integration is basically another

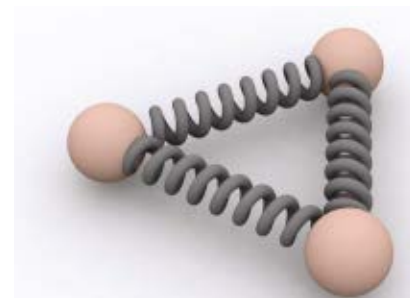


FIGURE 1 This simple spring mass system is similar to a particle system.

way of performing this physics advancement step. With Verlet, we do not store the velocity. Instead, we store the previous position; the velocity is implied as the difference of the current position from the previous position. The physics update then becomes:

$$F = \text{total of forces acting on this point}$$

$$T = \text{time step to update over}$$

$$X0 = \text{the previous position, } X1 \text{ is the current position}$$

$$X1 = X0 + (X1 - X0) * T + F / M * T * T$$

$$X0 = X1$$

Why use Verlet? Well technically, using Verlet integration is more accurate than using Euler integration when the forces vary along with position and velocity. The reason this is so is a little obscure, and for many practical game purposes this difference in accuracy is not a major issue. The main reason for using Verlet is that it makes it very easy to apply constraints to a physical system. When a point moves past a physical limit (such as one point moving farther away from another point than the maximum length of a spring that connects them), we can simply move the point back to a “safe” position within that length. There’s no need to calculate an impulse velocity, as the velocity is implied in the position and is automatically handled by the movement.

BUILDING A BLOB

Once I got the basic spring-mass system working, I needed to create a blob. I figured that since the natural shape of a body of water is a sphere (when subjected to neutral external forces, such as a rain drop, or a blob of water in zero

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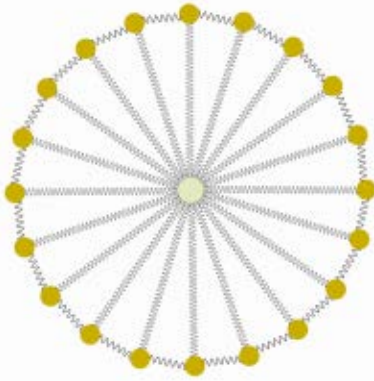


FIGURE 2 My first attempt at creating a 2D blob resulted in this single-skinned blob spring mass system, comprising a circle of 20 point masses with a center point.

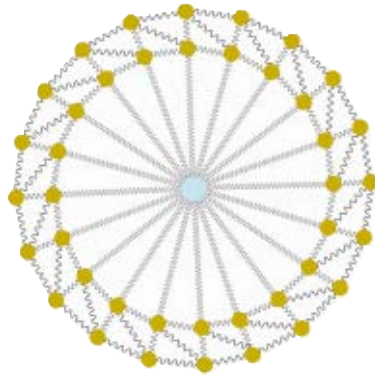


FIGURE 3 This double-skinned blob holds its shape better than the single-skinned one.

gravity), then I should start with a circular spring mass system. The application of gravity would naturally deform it into a nice blob shape.

My first attempt (Figure 2) was a circle of 20 point masses, each joined to each other and to a center point by springs. This is a standard N-gon, with the rest lengths of the springs being the natural lengths of the sides of the N-gon. This worked reasonably well for a first pass and gave me something vaguely blobby that settled into a circle under zero gravity and deformed a bit when resting on the ground under gravity. However, it suffered from three problems.

First, the “skin” of the blob (the lines around the edge) kept folding over itself, leading to ugly spikes in the skin. Second, the blob was either too wobbly, meaning the edges of the blob wiggled like a giant piece of Jello, or too stiff, meaning it looked like a rubber ball. And third, it kept snagging on things. The outer edges would wrap around a corner of the environment and the blob would hang there like a dishrag.

My first attempt at solving these problems was to make the inner springs (or spokes), have a longer rest length, putting them under compression, and have the outer springs (or skin) have a shorter rest length. I hoped this configuration would simulate surface tension.

Unfortunately, though, it didn't work very well. The shape didn't improve, and the blob tended to violently collapse if it was gently nudged.

A BETTER BLOB

I decided I needed to add a bit more structure to the blobs to make them more stable. After a few more failed experiments, I hit a solution: simply give the blob two layers of skin, one inside the other like concentric circles, joined together with a fairly rigid zigzagged set of joints. The inner skin is joined to a central point as before, as shown in Figure 3.

This doubling of the skins worked remarkably well. I had to tweak the constants a bit, specifically the number of segments, the thickness of the skin, and the strength of the springs. But quite quickly I had a very realistic acting blob, as shown in Figure 4.

Why does this work so well? A “blob” here is a blob of very thick and slippery liquid, something like mercury. Mercury has a negative coefficient of surface tension, meaning the “skin” of a drop of mercury has very different properties than its interior. I initially had thought that the increased tension within the skin structure of our new blob was in some way simulating the effects of surface tension. But after looking at it for a while, I saw that its main effect was constraining the curvature of the skin, thus smoothing out the high frequency wobbles we saw earlier. The blob simulates the appearance of surface tension rather than the underlying physics.

BLOB PROBLEMS

I encountered three major problems in implementing this system. First, the blobs tended to be unstable, wobbling all over the screen in the absence of external forces. Second, the blobs would get stuck, especially against corners, but also against surfaces. Finally, the blob edges tended to get twisted when they collided with the environment at high speed.

The first problem (instability) struck me as a bit odd, since Verlet integration is known for being a bit more stable than Euler integration. This problem had me scratching my head for a while, but I finally figured out that it was due to the order in which I was performing the updates. I was looping over all the points, gathering the forces for a point (from the springs), and then moving the point.

The problem was that when a point moved, the force it applied to another point via a spring would change. In the case of two points connected by a single spring, the force exerted by the spring should be symmetrical for each point. However, if you move one point before gathering the force for the second point, then the forces will be different. This causes the spring system to have a net force imbalance in a particular direction (depending on the order of update). The solution here was very simple. I just split the loop into two: one to gather the forces and the other to apply them in the integration step. This ensured that all forces were symmetrical.

The second problem (getting stuck) has to do with the way collisions are handled. Since the collision of a point is implicit in its last movement, if a collision resolution causes a point not to move very much, it effectively kills its velocity. For collision resolution of a single-point mass to work correctly (that is, bounce off the surface), the next movement must be of appropriate magnitude and direction so future movement is correct. However, we are not simulating points; we are simulating a blob, so we need to consider the movement of the system as a whole.

With a spring mass system, the compression of the springs can handle

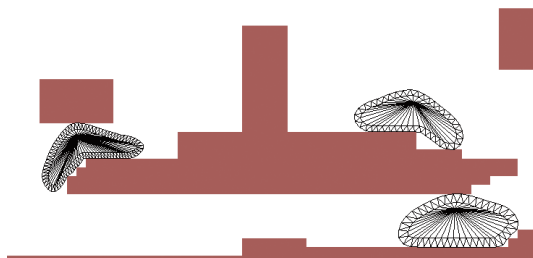


FIGURE 4 After adjusting the thickness of the skin and strength of the springs, the blob was able to move through the world without imploding.

the bouncing (to a certain degree), so if the leading edge points of a spring mass system simply stop when they hit a wall, the springs connecting to the points behind them will be compressed. Eventually, the whole blob bounces off the wall in a fairly convincing manner.

BUMPER BLOBS

This spring mass system works fine for something that just bounces up and down, but if the object hits surfaces at an angle, it needs to slide along the wall, too. This motion was quite easily accomplished with point/surface collisions by simply allowing the point to move parallel to the wall by the distance it would have originally traveled.

Something similar was done with line/surface collisions, but instead of the points moving parallel to the surface, they move parallel to the line, which allows the blob to slide over corners.

These collision resolutions were also where I implemented friction, simply scaling the distance moved by a constant (like 0.95) to give a relatively pleasing result. You could calculate a friction force to be applied in the next frame, but it's simpler to directly incorporate it into the movement calculation. In the demo, you can alter the friction by holding "S" (to become more slippery) and "A" (to become less slippery). Holding "S" lets the blob slip through holes faster.

The final problem was edges getting twisted. This generally happened because a point moved farther past another point it was supposed to

keep away from. Since the spring constraint only measures distance, the point is then pushed away by the spring, but in the wrong direction, causing the edge to become twisted. Once it's twisted, it does not become un-twisted by itself.

The simplest solution, and the one I implement in the demo, is to try to never move in large steps. The easiest way of doing this is to run the physics multiple times with a smaller time-step. In the demo, I run it six times per frame. Even so, the blobs can get kinks in them if shaken violently.

Something that exacerbates this problem is increasing the number of segments in a blob. With a large number of segments, the skin edges are much shorter, and so more likely to exceed their constraints in a single iteration. A lower number of segments works better. I found a 40-segment blob was impossible to kink, and yet still looked almost as nice as an 80-segment blob that was much more prone to kinking.

Running the physics multiple times is not ideal, as it can be quite expensive. A better solution would be to simply ensure the kinking does not happen in the first place, perhaps by adding some kind of angular constraint to a point on the surface. Another alternative is to link surface points to their second neighbors with a rigid constraint, so if the point gets past the first neighbor, then the second neighbor will push it back into the correct position. This type of second-neighbor constraint is commonly found in cloth simulation. ❌

RESOURCES

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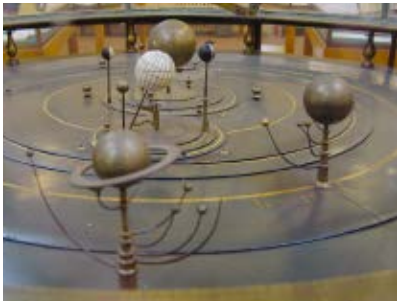
STEVE THEODORE

PIXEL PUSHER

THE CONQUEST OF SPACE

The final frontier of character setup

ARTISTS ARE FAMOUS FOR PREFERRING pictures to words (a certain keyboard-happy columnist we know being a notable exception). But learning how to talk about the things we know by intuition can be really important, even when it seems like you're stating the obvious. It's a little unnerving for the fellow who first stands up to tell an audience of smart people stuff they already know by instinct, if not in words. It's still a useful exercise once in a while.



Just like astronomers, animators benefit from thinking about motion in relation to other motions.

Color theory is a perfect example. Seeing the world as the interaction of hues, values, and saturations, or reds and greens and blues, is not natural. Once you've spent enough time messing about with color picker windows, using these abstractions may feel like second nature—but it's really the application of some very sophisticated abstract thinking. Esoteric it may be, but it makes your working life a lot easier. When you know that value contrasts are stronger than chroma contrasts, designing camouflage or deciding whether a wall texture needs a normal map becomes a much simpler task. Knowing how over-saturated colors mess with the perception of brightness helps you design a paint job for your giant killer robot, which enhances, rather than

obscures, his 3D form. These are great examples of how much you can benefit from a theoretical look at things you already know. Space is to animation and character setup what color is to painting. Like color, space is a simple abstraction that covers a lot of ground. Like color, it demands a little bit of study and thought if it's to be used effectively. And like color, it's a concept that becomes more interesting and more useful the closer you examine it.

THE SPACE PROGRAM

Call it groups, nulls, parenting, bones, joints, or whatever piece of jargon you first picked up, this menagerie of terms refers to a single theme: the control of space. Ordinary people think of space as something empty and formless, but even novice CG animators know that spaces can be ranked into hierarchies, moved, rotated, squashed, and skewed. This ability to rank and order space is so basic to what we do that we can easily overlook how odd it must seem to the rest of the world.

Spaces are important because they are where things happen, which (for computer animation at least) is critical for making them happen without going insane.

Consider a very basic example: Everybody knows that the moon moves around the Earth in a roughly circular orbit. Yet, the Earth itself flies around the sun in a huge ellipse. If you try to picture the path of the moon around the sun without considering the Earth, you'll realize it makes a horrendously complex pattern of loops in three dimensions, like a crazy Spirograph. You don't have to ponder very long to see how painful it would be to set all the keys necessary to describe that path through what ordinary folks would call "space."

However, with hierarchical spaces, every animator knows there's an easy way out of this. It's far easier to describe the moon's movement relative to the

Earth, and then the Earth's movement relative to the sun. In an animation package, we have a translation for these same relationships, and we would parent the moon to the Earth. Instead of the super-complex mandala path, its route becomes a simple circle (glossing over the fact that the earth is rotating, too, for the moment; coming up with these examples is hard work, you know).

Parenting is something most us learned within days, if not hours, of our first encounter with a 3D package. Still, it's a very simple example of a highly sophisticated idea. By picking the right frame of reference, a baroquely complicated movement—the spirograph path of the moon around the sun—becomes a very simple one.

That's why spaces are important: a movement that's almost impossible to describe or key in one space may be very simple in another. Stripped down to its essences, the job of a rigger is to find the right spaces.

If your character is walking or running, you don't want to have the IK targets for his hands just sitting around in the world (see Figure 1). If the hands' IKs don't live in the space of the body, they'll have to be manually keyed to match his movement through the scene, which is a lot of work for no reward. Or, you might have a character who is pacing around the room while arguing with someone else. If her head is rotating relative to her body, just focusing her gaze on the other character will take a ton of keys as she moves around. If her head is set up to rotate relative to the world (using an orient constraint on a control outside the body hierarchy) or relative to the other character (using an aim constraint), managing the head will be painless. Working in the right spaces gives you ease, speed, and more energy to focus on character and style, rather than mechanics.

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◀ **FIGURE 1** Using world space IKs for hands on a moving character demands a lot of extra work from the animator.

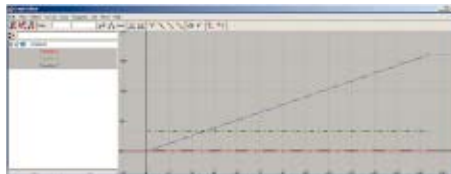


FIGURE 2A These F-curves represent the movement of a walking character's hips. The vertical bounce (green) and side-to-side sway (red) are very small; the forward movement (blue) is way out of scale.

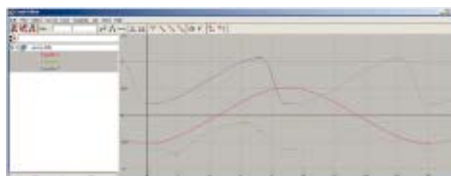


FIGURE 2B These curves represent the same motion as the previous curves, except that removing the large forward movement onto another node makes them cleaner and easier to read.

THE RIGHT STUFF

The most important question to ask when setting up a control is, “Where does the motion make the most sense?” Remember, it’s easier and simpler to describe the motion of the moon relative to the Earth than to the sun. Likewise, it’s simpler to describe the movement of a person in an elevator relative to the elevator.

You can tell a good spatial choice from a bad one because the bad ones always result in lots of counter-animation. Any time you have to set a key merely to make it look as if nothing has happened, you’re working in the wrong space. You shouldn’t have to run to stay in place.

Counter-animation creates drudgework. Just as bad, it also confuses the relationship between keys and action in the scene. Every key ought to indicate some action in the scene—a change of position, rotation, or acceleration. A counter-animated key, though, doesn’t correspond to any event in the scene, because its job is to look as if it weren’t there. This creates messy F-curves and a hard time for the animator who wants to tweak timings or find out what’s causing a hitch. If your F-curve or dopesheet is much more complicated than your actual

scene, your rig probably suffers from poorly chosen spaces.

Good space choices, on the other hand, typically show up as clear, readable curves. In Figure 2A, the set of F-curves represents the translation of a character’s root bone as it walks forward. This set is messy and complicated.

The F-curves in Figure 2B represent the same motion created with one important change in space arrangements. In Figure 2B, the character’s hips are parented to a separate node at waist height, which handles the forward movement through the world. This very minor change to the rig makes a huge difference to the animator because the second hierarchy is well matched to the task.

The advantage of Figure 2B’s arrangement can be seen clearly just by looking at the F-curves. The hips are bouncing and swaying by a few inches, but they’re also moving forward several feet. In Figure 2A, managing the keys becomes very difficult, since you can’t evaluate the different scales at the same time.

Hunting around in the graph view for the curve you want is a waste of time. Sometimes it even makes sense to arrange your controls so that values which “should” be on different scales are

closer together in units to make F-curve management easier. For example, if a hand moves through inch-sized world units and has an IK-FK switching parameter on it, you might want that parameter to run from 0 to 50 or 0 to 100, rather than 0 to 1, to keep both sets of keys in view at the same time.

A more subtle reason for separating the large scale movement from the local one in our example is that the movement combines cyclical elements—the bounce and sway of the hips—with acyclical movement through the world. The cyclical component of the move, which could easily be defined with just a few keys, is held hostage to the acyclical part. If you wanted to alter the hesitation at the heel strike of each footstep, you’d need to change the tangents or move every one of the dozens of forward translation keys. By segregating the cyclical and acyclical moves into different spaces, you can use the looping feature in your F-curve editor and only work on a single cycle, as the example shows.

The same problem happens when you’re working with multiple movement cycles on a single F-curve. For example, a rower in a rowboat will bounce up and down (relative to the boat) while working

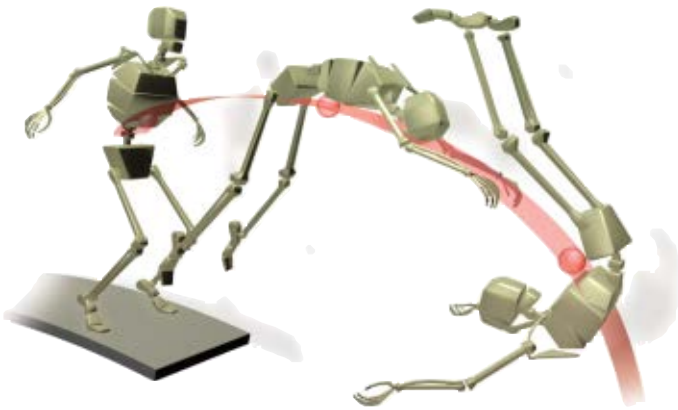


FIGURE 3 Treating the character root node as the character's center of gravity simplifies dives and tumbles.



FIGURE 4 This character's frame of reference is shown by its bounding box arrow.

the oars, but the boat itself will move up and down on the waves. If you animated the rower through the world, you'd be representing both sets of bounces on a single and messy curve. Obviously, if the rower is in the space of the boat, the animation would be easier to handle. Nobody with any experience would even consider animating the rower independent of the boat—yet riggers and animators often ignore the same type of situation when it comes up in a less blatant form, such as the secondary animation on a tail.

MISSION CONTROL

Manipulating the hierarchy to improve the key scope can be very powerful, but its easy to encounter pitfalls if the hierarchy becomes too complex. Consider the example of the walking character's hips: How can we tell which aspects of the movement derives from the world root, and which from the hips? Overlapping spaces are always dangerous. Unfortunately, they're also unavoidable in a system based on hierarchies. The best method for dealing with this conundrum is to be absolutely clear about the meanings of the different controls.

Just deciding what "meaning" you expect out of a given spatial arrangement can completely change the way a rig behaves. In the case of our walking character, you can get two very different kinds of performance from the setup

simply by being clear about how you want to use that extra root node.

One way you could work with that world root node is to pretend it is the character's center of gravity (Figure 3), which is a great way of dealing with acrobatic or ballistic moves: rolling, tumbling, diving. In the air, the body rotates around its center of gravity—not the hips—so if you try to tumble a character using the hips alone, you'll end up having to move those hips as much as you rotate them to create the right appearance.

It's far more elegant and simple to treat that root node as if it were the center of gravity. You'll simplify large moves through the world as we've already shown, and when the character leaves the ground, you'll be able to move and rotate the body without any nasty counter-animation.

On the other hand, you could use that root node solely to handle those large spatial moves. Most games see characters as just a point and an orientation on the ground plane, so it's often handy to specify that directly rather than relying on your animation exporter to figure out where the character "really is" for you. You might even use a box-shaped object corresponding to the character's in-game bounding box as the root so the relationship is completely clear. In Figure 4 this is shown using a big arrow, which

makes the character's frame of reference completely clear.

Gluing the world root to the ground changes what the setup is good for. If the root node is locked to the floor and limited to yaw-only rotations, it becomes a natural tool for animating movement cycles or navigating the world. You can also easily attach it to a motion path curve, a great way to visualize the character's path through a scene. In this kind of setup, it's wise to lock the controls you don't want to play with (such as vertical translation or roll) to make the meaning of the root node unambiguous.

SPLASHDOWN

Every so often, we need to step back and think about the basics. The simple example here is about as basic as you can imagine, but it illustrates a theoretical framework that's as important to animators as color theory is to painters.

Working in a young art form, it can be hard to step back from the day-to-day business of poly-pushing to see the larger picture of how we do our jobs. But even a little bit of theory can be a very powerful practical tool. Too much theory, of course, will leave you naked, covered in chocolate in a plexiglass box at the Tate Gallery.

Thankfully this doesn't happen very often in the games business. Getting that stuff out of your hair is a nightmare. ❌



SEAN KAUPPINEN

◆ BUSINESS LEVEL

TURNING FEATURES INTO COVERAGE



GENE TROOPERS was aimed at both tech-heads and traditional gamers through targeted press coverage.

I'M OFTEN SURPRISED AT HOW MANY GREAT games come out that don't get the media coverage they deserve. These games typically have great characters, beautiful environments, and unique elements, but unless your public relations campaign is built around these features, the press won't communicate them to the consumers before the title's release. If potential consumers aren't correctly informed of a game's features and selling points, you miss out on a lot of potential sales.

WHAT DOES THE CONSUMER KNOW?

When I worked on the launch of PLANETSIDE in 2003, some members of the launch team wanted to coin a new term: massively multiplayer online first-person action game (MMOFPG). The acronym variations raised some interesting issues, but I felt it was necessary to put forth that PLANETSIDE was an MMO first-person shooter. We were targeting consumers who understood MMO and FPS games, but were trying to use a term they wouldn't easily understand, which would have created unnecessary complications.

There had already been some first-person shooters that let the player take on other roles (not just shooting enemies), and we wanted to leverage that. PLANETSIDE wasn't just another FPS game, and the extra play styles the game provided were a very key feature. Because of that, the team felt a need to use the description as a differentiator.

Soon after launch, we confirmed that consumers wanted to call it an FPS, and we dropped the whole idea of the MMOFPG. Still, we continued to push the

features that made it both MMO and FPS, and we garnered lots of coverage on the different ways people played the game.

A FEATURE SET IS A FEATURE SET

From the PLANETSIDE launch, the whole team learned the importance of knowing the strengths and weaknesses of the game's genre, its competitors, and its targeted audience. You've got to market those areas where the title stands out, rather than those that are expected.

For example, if the title you're publicizing is a sequel that has moved from 2D to 3D, when most of your competitors are also 3D, that's probably not the strongest point of differentiation. However, if the game is the only one that uses Shader 2.0, specular lighting, and Ageia physics to deliver a new level of immersion and realism never seen before, you've got something—but you need to be careful how you present those elements as well.

To a technical audience, the inclusion of cutting-edge technology shows that the game is pushing the limits of innovation. The average PC game player doesn't care about the specifics of the technology, though. They want to know if the game's graphics take advantage of their video card.

Console gamers are even less interested in technology, but have higher aesthetic expectations. They want to know that the title is going to give them the most fulfilling game experience with breathtaking graphics-period. They don't care what it takes to deliver it.

Both groups have something in common, though. They both want to see what's being offered rather than hear what you have to say.

Getting back to PLANETSIDE, we had a key feature in that thousands of people could play on a single server, and battles often had hundreds of players engaged in all-out combat. This feature was something no other game offered, and no one had ever seen an FPS of this scale before. We took this concept of player convergence

and made sure the majority of screenshots released showed large armies engaged in frenetic combat.

DO YOUR HOMEWORK

Whenever we start a campaign, the first thing we do is relate the game's features to those of similar games. One game I marketed, called GENE TROOPERS, had gameplay elements also seen in TIMESPLITTERS: FUTURE PERFECT and HALO. A thorough analysis of the coverage showed that certain features were loved or hated by a large number of journalists. We used this information to better target journalists with solid messaging, while being prepared to answer their tough questions about the game.

Armed with a detailed plan, messages, and our feature set, we identified which features would constitute our unique selling proposition. We took these key selling points and figured out how to present them to different audiences.

In GENE TROOPERS, high-polygon character models were leveraged to both hardcore gamers and more typical consumers. To reach the hardcore players, we created a developer diary and released wireframe comparisons and technical information. For the average consumers, we worked on a feature story with an enthusiast magazine and an online site that showed concept art, screenshots, and video featuring good-looking gameplay footage.

The key point is there are probably hundreds of story opportunities surrounding any one game—they just need to be presented properly to the right journalists and audience, which requires reading past material written by different media outlets.

BASES COVERED

There are common problems in any campaign, but if you put yourself in the audience's shoes and think about your features, you should be able to reach more people, and the payoff is money in the bank. ❖

SEAN KAUPPINEN has launched more than 300 games for companies including Electronic Arts, Ubisoft, Sony Online Entertainment, and Vivendi Universal. He is the vice president of Kohnke Communications, based in San Francisco. Email him at skauppinen@gdmag.com.



NOAH FALSTEIN

» GAME SHUI

BETTER LIVING THROUGH GAMES

ALFRED NOBEL MADE MOST OF HIS MONEY inventing dynamite and selling munitions. But today, he's better remembered for the prize he founded as a way to promote peace. At GDC 2006, Eric Zimmerman asked gamemakers to make a similar shift from explosions to peace, hosting another of his "Game Design Challenges," this time based on the following theme: the Nobel Peace Prize.

In the challenge, contestants dream up a new game somehow tied to the theme of the challenge. Contestants Harvey Smith (DEUS EX), Cliff Bleszinski (UNREAL), and Keita Takahashi (KATAMARI DAMACY) came up with some intriguing and amusing possibilities. But this year, the real winner may have not actually been in the room.

CONFLICT UNDER FIRE

A couple of weeks after GDC, I was invited to the debut of a game called A FORCE MORE POWERFUL. Funded by York Zimmerman Inc. and the International Center for Nonviolent Conflict, the game is designed to teach strategic thinking skills that can be used in nonviolent conflict resolution. It instructs the player to think like a revolutionary, with a wide variety of real-world techniques at hand to overthrow governments, root out corrupt officials, and restore or establish civil rights.

Teaching someone to think in terms of large-scale, interacting, and potentially conflicting organizations and political systems is actually a great application for game-based learning. It overlaps well with some of the strengths of a game like CIVILIZATION or AGE OF EMPIRES.

In developing A FORCE MORE POWERFUL the team brought in Ivan Marovic, a

hardcore gamer and revolutionary who helped overthrow Slobodan Milosevic.

The game solidly incorporates the Stealth Education principle (see "The Right to Bare Arms," Game Shui, August 2005), where the critical information the developers want you to learn is built into the gameplay, taking a backseat to the game goals, but encouraging the player to succeed through learning as much as possible.

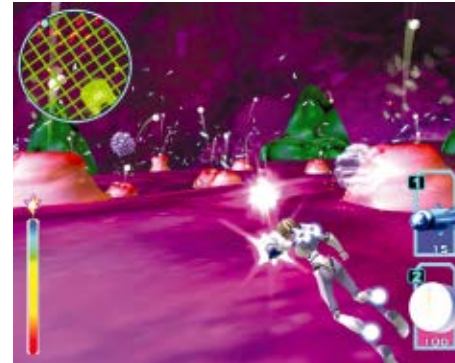
I'm not sure A FORCE MORE POWERFUL will meet all its ambitious world-transforming goals, but it's a very promising and intriguing instance of how the field of serious game is maturing. It may even save lives. And perhaps more surprisingly than that, it was the second game with such potential that I saw in one week.

PEDIATRIC MISSION

RE-MISSION, a serious game from Hopelab, was developed by Realtime Associates. I did some early work with the organization on a previous iteration of this game five years ago and have been waiting eagerly for its release. Hopelab is dedicated to creating games that can make life better for children with serious illnesses. RE-MISSION was designed to be played by kids with cancer, teaching them why they need to stick to their treatments. And it works.

In a trial of unprecedented size and thoroughness for a game, Hopelab tested RE-MISSION on hundreds of actual cancer patients. The creators found that playing the game correlated with a significantly better adherence to treatment and higher levels of chemotherapy drugs in the children's systems. Bottom line: The game is actually likely to save the lives of young cancer victims.

Perhaps even more remarkably, the game achieves this end without being stiff or preachy. It uses a *Fantastic Voyage* point of view, where the character you control is a nanobot inside the body of the patient, projecting a cell's-eye view of the body's fight against cancer. Appropriately,



Hopelab's RE-MISSION battles cancer.

it embodies the Stealth Education principles too, as an exciting third-person shooter with fairly terrifying enemies—cancer cells and bacterial infections—where the better you know your foe, the better you will succeed. Ironically, RE-MISSION is perhaps the first violent shooter game in which one can feel completely morally justified in destroying the enemies.

GERIATRIC WORKOUT

These games came in the wake of a GDC where the talk of the conference was the Nintendo presentation featuring BRAIN AGE, a game designed to help keep aging brains in shape, which sold record-breaking numbers to a Japanese baby boomer audience over the last year. BRAIN AGE may not save lives as literally as these other two titles, but writing as someone whose father died after an awful decline through Alzheimer's disease, anything that has the potential to even marginally lessen that kind of suffering deserves praise.

I've seen enough new movements and trends in this industry to develop a good feel for the ones that were fads (like virtual reality glasses and data gloves) and the ones that were true revolutions (such as the migration to CD-ROM or the introduction of true 3D). The field of serious games is one of the latter.

It's intensely gratifying to work on games that are both fun to play and can save lives or ease suffering. It's also worth noting that in order to meet these ends, these games have substantial budgets—yet, the developers get to break out from the often stifling creative bonds imposed on other mega-budget (movie-licensed) titles that are at the core of our industry today.

Perhaps a Nobel Peace Prize for a game isn't so far off. ❖

NOAH FALSTEIN has been a professional game developer since 1980. His web site, www.theinspiarcy.com, has a description of The 400 Project, the basis for these columns. Also at that site is a list of the game design rules collected so far and tips on how to use them. Email him at nfalstein@gdmag.com.



JESSE HARLIN

✦ AURAL FIXATION

DEVELOPERS, MEET YOUR REVIEWERS

THERE IS A MYSTERIOUS REALM THAT

every game must travel through on its way into the hands of the consumer: the video game press. There's no denying the immense impact that reviews can have on shaping public opinion and influencing sales, and there's a huge gap between the development team and the consumer's living room sofa. Yet, as important as great reviews are to our collective bottom lines, most game developers know little—if anything—about the enigmatic processes that go into shaping a game's final review scores.

Guiding us through this alien world will be Jeff Gerstmann, senior editor of GameSpot.com, and Peer Schneider, vice president of content publishing for IGN.com.



DRIVER: PARALLEL LINES drew some criticism from reviewers for its inconsistent audio.

A QUESTION OF FIT

To begin, I asked our insiders how much time is typically devoted to evaluating a game's audio. Both admit that audio rarely gets singled out during the review process. According to Schneider, "A trained reviewer listens to the audio the entire time while he plays through the game, and constantly notes what he likes and what he dislikes." Gerstmann agrees, saying, "We're really concerned with how the audio fits into the complete package, rather than taking the audio out of context."

This concept of audio "fitting" is a common theme when talking about the process of reviews. For Gerstmann at GameSpot, reviewing audio is about "trying to start with as few preconceived notions as possible. When it comes to

audio, I'm usually looking for sounds that fit the action. If they fit, are they used properly?" IGN's approach is similar. "While a lot of games strive for authenticity, we're also looking for originality in sound design and how well the sound effects match the actual game."

Frequently, audio is judged on how well it fits within its given genre or alongside preceding titles in the same franchise. GameSpot has "reviewers that tend to specialize in a handful of genres," says Gerstmann. "As such, that person is usually also familiar with the previous games in a series already."

For Schneider, "How a sequel stacks up to its predecessor is an integral part of all our reviews. If a game is known for its grand score or amazing surround sound and the sequel doesn't live up to those high marks, then we'll note that."

Speaking of grand scores, it's a question of fit regarding a game's soundtrack as well. "As for music, some of the same stuff applies," says Gerstmann. "Music that loops too frequently tends to get annoying very quickly. Licensed music that doesn't fit with the action just sucks. Ideally, music should be a cohesive part of the game, not another revenue stream."

ENVIRONMENT CONCERNS

With so much riding on the reviewers' subjective perceptions of the audio, the importance of aural presentation becomes paramount. As such, I asked our two media outlets to describe the environments in which our work is being heard. As it turns out, both companies have surround sound systems they use for evaluations.

At IGN, "reviewers have access to a Dolby-certified demo room loaded with consoles, PCs and a 16-player LAN room. A Denon receiver and a Klipsch 7.1 'Reference' speaker setup to ensure that the reviewers get to hear the games' full audio potential," says Schneider. This is likely not used to review every game, though. At GameSpot, reviewers have "TVs

with basic stereo speakers as well as a 5.1 setup that we can use for games that support it. It's nothing terribly fancy."

For both outlets, this was a primary concern. "We tend to find that the average game player doesn't have the best TV or sound setup in the world," says Gerstmann. "We're attempting to mirror their experience."

Schneider concurs. "Editors spend considerable time playing and evaluating games on smaller screens and via headphones. We take the actual player into account when reviewing audio."

THE VERDICT

Inevitably, it all comes down to the final score. So what separates a 7 from a 10? Again, both organizations had similar ideas.

"An audio score of 7 would apply to games that have competent audio with some obvious flaws," explains Schneider. "These flaws could include boring compositions, issues with voice acting, mismatched or delayed sound effects, or crackling audio. A 9 gets you into 'fantastic' territory. Things really have to come together for the high scores. Any game getting a 10 in the audio department nails all aspects of the package. The audio presentation would have to be technically proficient as well as perfectly match the gaming experience."

Gerstmann adds, "Fidelity also comes into play. As a recent example, DRIVER: PARALLEL LINES uses pre-rendered cutscenes, but also has in-mission dialogue. In the cutscenes, the speech is crisp and clear. In-mission, it sounds grainy and lo-fi like, as if they dropped 8-bit 22KHz samples in there. That's probably an exaggeration, but the dramatic difference in audio quality becomes quite glaring over the course of the game."

In the end, "there's no mathematical formula for figuring this stuff out," says Gerstmann. "It's really a matter of weighing the good against the not-so-good and figuring out where it falls." ✦

JESSE HARLIN has been composing music for games since 1999. He is currently the staff composer for LucasArts. You can email him at jharlin@gdmag.com.



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by Rick O'Connor



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games as Nadeo's TRACKMANIA NATIONS, Bongfish's STOKED RIDER, CustomPlay's CUSTOMPLAY GOLF, Atari's TEST DRIVE UNLIMITED, Telltale Games' TELLTALE TEXAS HOLD 'EM, and Xing Interactive's KICK 'N' RUSH SOCCER.

Townsend recognizes that with three companies serving dynamic advertising, publishers may feel they have to choose one over the others. But that's not necessarily true, he says.

"My best recommendation to publishers is to try out everybody," Townsend says. "This is a brand new field. We don't suggest that any publisher does portfolio exclusivity with one company right now; we're only suggesting title exclusivity. There's no reason a publisher can't allocate one title to Massive, one to Double Fusion, and one to us—and then test them out over a year and see who delivers the best service, the highest revenues, and the best contextual advertising."

Forecasts for in-game advertising are excellent, Townsend reports, especially since as recently as 12 months ago, sales teams were still cold-calling prospective advertisers. But now, "advertisers are literally beating the door down. IGA Worldwide now represents millions and millions of advertising dollars ready to be spent across the period 2006 to 2007. What has changed is that there is now an acceptance of in-game advertising's effectiveness within the advertising industry," he says.

What has also changed, according to Townsend, is that publishers are going through challenging times.

"With next-gen games on the horizon, you're looking at

development teams jumping from 25 or 30 people up to 100 people, and yet there are no new revenue streams. Where else are publishers going to find the extra money if not for in-game ads, which can help them offset those additional costs?"

LET'S NOT FORGET TECHNOLOGY

Although in-game advertising is being fueled by both the publishers' needs for additional income as well as the advertisers' recognition that games target the same demographic as they do, a third factor exists, without which there would be no in-game advertising.

"Five years ago, when all we had were blocky graphics, there would have been no way for advertisers to represent their products well enough," says Midway's Allison. "We were experimenting with ad deals back then but not getting anywhere; the advertisers would see how their products looked in the game and tell us 'I'm not paying you for that. That looks like crap.'"

But now, he says, the games look practically photo-realistic. "We can put a can of Coke in a game and a character can crush it or drink from it ... and it looks just like it does in real life. We can now get a clothing company to put its new line on our game characters, and that's awesome. It's something we've never been able to do before. And it comes at a time when publishers can use the extra income. Will we someday be able to make a \$5 million deal for a triple-A game? I hope so. God bless us if we do." ❖

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